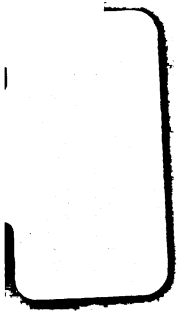

# THE NEW PHILOSOPHY
## OF
# MODERN SCIENCE

BY
W. W. STRONG, B. S., Ph. D.

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The author was formerly Scholar, Fellow, Fellow by Courtesy, and Assistant at the Johns Hopkins University; Research Assistant of the Carnegie Institution of Washington; Instructor in Physics at the Carnegie Institute of Pittsburgh; Fellow of the Mellon Institute and Professor of Electrical Theory of the University of the Pittsburgh; and a Director of the S. I. E. M. Co.

The author is a Fellow of the A. A. A. S., a Member of the American Physical Society, a Member of the A. I. E. E., Franklin Institute, etc. Consulting Physicist, Expert on Ionization of Gases, Electrical Theory, the Precipitation of Fumes, Dust, Smoke, Mist, Fogs and All Kinds of Vapors, Research Investigator on the Causes of Fires and Explosions Due to Electric Static Sparks, Expert on Electrical Methods of Evaporation, Oil Clarification and Deblooming, Electrical Smoke Apparatus, Grating Replicas, Gas Methods of Treating Contageous Diseases, Fume Masks, etc.

Most of the references to physical and chemical work in this book can be obtained from the author's index of Science Abstracts for the past few years. Many of the subjects are treated more technically in the New Science of the Fundamental Physics. The price of this book has been greatly raised by conditions beyond the control of the author and the publisher.

## DEDICATION

This little Gospel of Research in Effort, Love, Faith and Optimism comes from the inner Spirit in its Quest for an Abiding Harmony: it grew midst the cycles of green fields and the white snows of the valley: it felt the throbbings of a nation's heart in a Great War and the aftermath of a confused Peace: it saw Devotion and Sacrifice and the microbe citizens of the nation poison Patriotism with the venoms of selfishness and hostility: it was blessed with the Alternation of the Divine Faithfulness of a True Mother and the Confidence and Love of the soul of a Child: it was cruicified by the toxins of physiological processes, of a dollar philosophy, of the animal selfishness of the cattle dealer and it constantly encountered the curiosity and the gossip of the deep, repelling, critical apathy, superficiality, ignorance, dense superstition and Stone Age philosophy of the poor specialist serf souls: it was preached to the very inner multitude without being heard: its effort to rescue dying souls to Freedom was met by a dumb revenge, the stab of the dagger in the back or by the scorn that assumed that the imperative to inspire vision was the derangement and irresponsibility of the slothful and apathetic slacker of their religion of dollar grabbing and empty ritual: yet, antithetically, there remained the Enthusiasm of the Lone Inner Urge and Faith.

This message is dedicated to You to become a New Philosopher and it Pleads with you to endow the Imperatives of the New Philosophy with your Soul and with your worldly goods and efforts. It trusts that you will see the Vision of your own specialist slavery: that you will cease to drift among the doldrums, the derelicts and the death storms of ancient, abysmal and heathen environmental philosophies: that you will be born to the New Birth of the Kingdom of Sacred Aims Within: and that you will devote the remainder of your life in a Voyage to Discovery, Abiding Accomplishment and Freedom. The yearning comes to all (that struggle to See and to Hear with the Inner Spirit) to rescue ourselves from the external world that appears as but a dead automaton. We endeavor to sacredly nourish and cherish the Divine Willings and Visions with the profoundest Wisdom, the deepest Love and the fullest Service that the most carefully cultured soul can exert. This is the Earnest that promises the deepest Meaning to Life: this is to be the application of our

Hours of Golden Opportunity Blooming in Resonance with the Sunrise, the High Noon and the Evening of the Soul's Endeavor.

As the Setting Sun Sinks and Darkness Covers the Fading Measures of our Time, may the Christened Striving of our Soul Consciences Bring us to a Haven of a Full and Lasting Achievement. May we be ever Free, Brave and Noble enough to Fear only Error, Ignorance and Weakness? May we continually commune in this life with the Divine and the Great? May we walk here and now with Christ and Socrates? Let us be too busy with the Great Vital Issues to spare time to gossip, pull and push with the little men and women of the ant hills? May we never be specialists in aim but only as a means to Higher Imperatives? May we be, not farmers, undertakers, lawyers, unbelievers, high caste children of ease and ignorance, disciples of devilish shrewdness and opportunism, the ashes in a Moloch of worldly egotism and success, and semi-demi-amateurs in the Most Serious Philosophy of the Ages, but Fixed Stars to Illumine other Souls to Triumph, Burning to set the world aright, real Men and real Women.

## CONTENTS

## 1. AN INTRODUCTION TO THE NEW PHILOSOPHY

**(1) Our Complex Philosophic Systems.** As one goes down the by ways and the high ways of life, noticing the philosophies that are paraded and acted, one is interested, perplexed, sometimes gratified by its temporary coherency and the sunshine of it and at other times pained and deeply hurt by the crowning stupidity of it all. There are philosophies of men and women, of Jew and Gentile, of Chinaman and of Hottentot, of the high and the low, of the educated and the ignorant, of the Oriental and the Occidental, of the farmer and the banker, of the scientist and the politician, of the tenement house boy and the debutante, of the laborer and the artist, of the teacher and the undertaker, of the abbot and the soldier, of the ants and the lions, of the germs and the mastodons, of the bees and the turtles, of the sperms and the ova, of electrons and hydogen nuclei and the earth and the Venus people. The philosophies of these individuals are not carefully planned and invariant systems that are subject to revision only after sufficient care and reason have been exercised, but they are an almost unordered chaos that changes with the moods, the clouds, the day of the week and the time of the day, the state of the health, the ratio of the toxins to the antitoxins, the persons and the problems of the environment, the history of the individual and an almost innumerable number of other factors. In church David Harum exhibits a very different philosophy from that which he uses on Monday in a horse deal. Dr. Jekyl and Mr. Hyde are only two of the many chameleon colorings that strive for the supremacy in our conscious equilibria and which are constantly subject to kaleidoscopic change. The transformation in our prebreakfast philosophy effected by fresh eggs, bacon, toast and a cup of coffee is inspiring. The insulting pride and the bigoted arrogancy that result from prosperity and power constitute some of the unsolved problems of the race just as positively as do those of poverty and pessimism. "The devil when sick a monk would be, the devil when well, a devil a monk is he." How infinite is the numbers of the church, the fraternity and the marriage vows, the platform promises of the politician and the treaties between the states that are violated or at least forgotten? Self interest in the procurement of food, shelter, raiment and the beast instinct to live constitute much even of altruism, in that we invariably exhibit idealism by working

for these aims for our fellow men. Children, women and the vast majority of men are romantic but the thrills and the marvelous, that the uncultivated imagination seeks, pertains to the life of the earth earthy as it is allied to naturalism. The unifying spirit of wisdom, morality and ethics is made an atrophied Appendix to the Colon, of the Animal Desires of the Multitudes. The Higher Christianity is almost as rare as in the days of Christ. To most men heaven is a magnified image of the picture of two healthy lovers on a day in June.

This medley of philosophies in all their varied hues is not only the weakness of the individual but it is also the sleeping sickness of all our institutions and organizations. All thoughts, words and deeds are the effects of very intricate philosophical forces. Wherever a problem is presented, and every change of circumstance and development and application of philosophy is fraught with an infinite multitude of these, there we have a condition for every individual to go off on a tangent to every possible curve that may offer a path to a solution, and the number of these curves is often mathematically and philosophically very great. A Neroic Environment of world aim and idolatry constantly drives the Utopian Philosophical Republic to Anarchy. The macroscopic integrals of the chaotic philosophies of the individual as he forms the mob, the crowd, the school, the state and even the sacred church are almost as irreverent to the ideal as are the individual microscopic terms themselves. The opinions of majorities are far from inspiring.

The great increase in the range and the density of our knowledge has correspondingly and terribly increased the technique of civilization. The butcher and the baker can hold up a city by a strike but the light producing candlestick maker is less potent. The mechanism of civilization is top heavy and threatens to crush us all when it falls. All kinds of philosophies become pandemic by the contagion and repetition of words, phrases or abbreviated allegories. Pandemics of this sort follow each other in quick and alarmingly unexpected succession in all the phases of human endeavor. On account of their lightning swiftness and our inability to know how and where they will strike, it is almost impossible to administer an antidote before the evil is effected. The only promising method of prevention appears to be the universal inculcation of a saner philosophy. The rise and fall of man and his empire will constitute a laboratory problem for many centuries.

The endurance of a uniquely interpreted bible and constitution under these complex conditions is inspiring to that urge of the soul for an absolute law and philosophy. But we do

know that nations have fallen. Religions disappear. Constitutions crumble. The meaning of the good, the beautiful, the useful, duty, love, right, truth, wisdom, honor, value and the goal of man is constantly a subject of debate. Nothing seems as chimerical as the philosophical. But the reality of the man of the street is the reality of his ignorance. The perfection of the proletariat is its supreme blindness. Science itself is seeing but the mirage of the desert when it exterpolates its experience. Literature is steeped in the Romanticism of its Rousseaus. Religions deal in Parables. There is ever the ebb and flow tide of self realization and self control in which no definite goal is available. The Devil has been said to be the most fluent quoter of Scripture though no one has ever accused him of understanding it. We therefore humbly ask for vision. "Is there no balm in Gilead? Is there no physician there?" "Can the Ethiopian change his skin or the leopard his spots?" Is there an Abiding Reality? Can a unique system of philosophy be erected? Is there an Absolute System of Values and a Goal for the attainment of which the energies of life may be spent? Can the life entities understand each other through a common and fundamental language?

Modern knowledge supports the view that there is one consistent and absolute system of philosophy. The evolution of this system is slowly taking place. There is but one physics, one biology, one chemistry and one kind of truth. Wherever morality and ethics have dealt with clearly defined terms there has been but one system. (1) OUR MODERN EXPERIENCE INSPIRES US WITH THE FAITH THAT THERE IS ONE UNIQUE AND UNIVERSAL PHILOSOPHY FOR ALL THE ENTITIES AND THAT THIS PHILOSOPHY OUGHT TO BE THE BASIS FOR THE BIRTH, THE GROWTH AND THE EDUCATION OF EVERY CHILD. THERE IS BUT ONE TRUTH AND ONE UNIQUE AND MINIMUM PATH TO THE TRUTH. THE ENTROPY IMPERATIVE OF THIS PHILOSOPHY SHOULD BE OUR INVIOLABLE COMPASS. THIS PHILOSOPHY TREATS OF THE SCALAR AND VECTOR NATURE OF FLUX. The skin of the Ethiopian and the spots of the leopard are to be explained and produced at the will of the laboratory. Gilead is to be so restored that no balm will be needed there. The small grain of formulated design is to replace the ounce of prevention and the pound of cure. Many present perplexities will automatically disappear. Frankness, simplicity, publicity and the control of our food, thermostat and animal love urges will eliminate even the cause of duplicity, deceit, cruelty and lust for power and dominion. Our news and our knowledge will not be a complex due to superficial and distorted fact, outright fiction,

rumor, propaganda, advertisement, fear, gossip, clue, politics, business, religion, hope, pessimism, insinuation, omission, a censorship of a dozen different varieties, the aims to please the readers and all the ills, humors and transient purposes of those that manipulate the sources and transmitting processes of information as well as our own philosophical conditions as readers. The truth is the "simplest" expression that we can give to phenomena. The new philosophy is to guide us "simply" to the truth and it is to be the "simplest" expression of truth that we can make. The very condition that the structure of phenomena is very complex requires that the Principle of Least Action should be employed in its description as exhaustively as possible. The present complex of civilization is to be drastically pruned. The impedimenta to progress are to be removed. Posterity is to be selected by wisdom rather than come by the blind love urge of many that are philosophically blind. Society is not to remain a colony of uncontrolled cancers. The removal of slavery, cannibalism, opium, war and alcohol are steps towards the time when the very mountains that hem us in shall be removed by faith and wisdom. Eugenics will decree that only "the Meek (in Wisdom) shall inherit the earth." (2) PROGRESS, CIVILIZATION, VITAL EVOLUTION, THE FORCES OPERATING IN THE STRUGGLE FOR EXISTENCE, DEATH AND THE NATURE OF THE INNER URGES ARE NOT TO BE ALLOWED TO DEVELOP SPONTANEOUSLY BUT ARE TO BE THE PRODUCTS AND THE RESULT OF THE OPERATION OF THE UNIQUE PHILOSOPHY. That the immediate problems are great and pressing all cultured souls will admit.

If you are not fully persuaded of our common and present plight, of our intellectual houses haunted by fairies and demons, of poles and antipoles ,of balanced and unbalanced equilibria, and of the Great Fantasies of Exterpolation, try to define the following terms to yourself, to your neighbors, to the people in Venus by wireless, to your own phagocyte blood corpuscles that constantly make the supreme sacrifice of their lives that you may live and to those units of life that carry your unwritable philosophy to your posterity, the sperms and ova. If you consider that the problem is unfair remember that each of us is born into the world, live and die without being able to speak to the billions and billions of cells that constitute our own cell colonies, that we are almost totally ignorant of the one hundred and fifty quadrillion bacteria that compose our intestinal flora, and that we speak to one another by setting up air waves or by moving the parts of the eye or some other portion of the body. We communicate to one another by mechanical motion only. This Extravaganza and Exterpo-

lation of a Macroscopic and Mechanical Language is largely responsible for our present philosophical paradoxes. If you doubt for one instant the total inadequacy of our spoken language, try to define to any intelligent soul bereft of sense organs the meaning of the Sun Rise, the Sun Set, Autocracy, Democracy, Honor, Love, Treachery, Hate, Identity, Difference, Loyalty, Faith, Force, Freedom, And, But, Is, Not, The, It, Out, In, Space, Time, Direction, Ultimate, Reason, Habit, All, Resonance, Implication, Between, Beyond, Point, Plane, Cause, Effect, Instant, Series, Order, Group, Feeling, Sensation, Recognition, Operation, Immortality, Idea, Law, Chance, Duty, Zero, One, Two, God, the Soul, Ideal, Objective, Subjective, Service, Progress, Pain, Substance, Entity, Induction, Deduction, Creation, Predestination, System, Mark, Intersect, Straight, Curved, Parallel, Means, Aims, Motion, War, Peace, Simple, Complex, Ego, Stream of Consciousness, Sound, Light, Taste, Thought, Intuition, Originality and Universe. Do the splotches of ink in Baldwin's Dictionary of Philosophy and Psychology offer much aid in our problem of wig wagging our inner soul content to a life entity in another planet? And yet it is this very universal social urge to communication that frees us from our own inanition and ignorance. The life entities from the genes to the human cell colonies feel the imperative of social attraction as certainly and as utterly as do the electrons and the hydrogen nuclei experience the electromagnetic and the gravitational urge.

After the array of words comes the Phrases, Proverbs, Symbols, Customs, Rituals, the Work of Secret and Open Fraternities, Manners, Cults, Creeds, Laws of the State and the Church, the Written and the Unwritten Natural Law, the Sciences, the Religions, the Languages, the Literatures, the Arts, Music, the Atmospheres, Common and Uncommon Sense, the Sense of Story, the Harmonies, the Picturesque, the Spirit of the Times or of Reverence, the Beliefs, the Unbeliefs, the Hopes, the Fears and Last but the most perplexing of all, the Philosophies. What shall we say then in the midst of this Complex as to the Form, Origin and the Nature of the Universe? of Knowledge? of Reality? of the Understanding? of the Will? of the Soul? of the Relations between Bodies? of Space? of Time? of Design? of God? of the Feelings? of the inner Imperatives? of Truth? of Consciousness? of Flux?

All of us will confess that our souls possess a content. The immediate problem is to describe this content to other souls by means of a language. The paraphernalia of language includes the employment of universal and fundamental entities as the letters of the system, the selection of fundamental units for the establishment of a metric system of values, the adoption of a set of axioms or postulates and the discovery of the funda-

mental relations and laws that hold in the microscopic worlds. The method is artificially illustrated in the axioms and the definitions of Euclid's geometry. The new philosophy starts with an effort to establish a philosophical language and it considers this as a laboratory problem. It formulates an immediate program and takes this to the laboratory. The new language is to be both selected and discovered. It is to represent an approximation to both the subjective and the objective worlds. It is to express both. It is microscopic and it assumes that the macroscopic is the summation of the microscopic with a loss of much detail. But loss of detail appears to be the universal process that permits of macroscopic unities. This is well illustrated in the power of art to represent what is wished with a minimum of minutiæ. The method is employed in the sciences such as physics and chemistry. In mechanics there is a very important expression called the Principle of Least Action. In the formula of this law it is necessary to use symbols that have been previously defined by axes, coordinates and the entities that are connected with a description of motion. In philosophy there are certain expressions or postulates which we may assume to be related by a more comprehensive Principle of Least Action and the scaffolding which will ultimately be used to express this system of the new philosophy we will call its language. This language is not to be considered as artificial or as dead and mechanical in any way. It is a part of every vital entity and is also involved in all objective flux. It is the basis of the imperatives that have carried us as individuals and as a race to our present condition of consciousness. There is a Royal Highway to our Goal of Existence and this is by way of the Path of a conscious Vital Entropy Imperative. The superstitions and the mythologies of our phonetic and mechanical motion dramatics are as colossal and exaggerated as the Myths of Cathay, the Fountains of Perpetual Youth, the El Dorados, the Seven Cities of Cibela, Bagdad, the Land of Ophir, Lhassa, Cipango, the Countries of the Great Khan and Prester John, the Poles and the Old Moon Mountains. The Frequencies that flood through our senses, the Structure and the Partitioning of Energy, the basic Relations of the Electromagnetic world and the universal Vital Imperative of the Life Entities that slowly gather the Gains of Evolution through the ages promise a much more fundamental basis for language than the present artificial and hieroglyphically originated system.

(2) **Conversion, the Party System and the Great Compromises.** In explaining your philosophy to your fellow-man you will invariably encounter arguments from every chair, bench and workshop. New fields and all problems of politics, re-

ligion, morality, civics, ethics, art, science and every phase of human thought and action have hypotheses with supporters and opponents, schools, creeds, parties, factions and clans. And Progress always involves the solution of problems. In history the two party system of the Anglo-Saxons illustrates one of the greatest inventions of politics and, at the same time, one of its profoundest paradoxes. The Bulls and the Bears of Wall Street and the Balancing of the Executive, Legislative and the Judicial systems in our American government are examples of the party paradox that appears as one of the best working schemes of civilized man. To accomplish something it seems almost necessary to cause a rent in the philosophies of men before we can attain their conscious attention. We must be either hot or cold but not lukewarm. We must join all sorts of organizations. It is sometimes said that certain bacteria only become virile in a hostile environment. The barren rocks of Plymouth are said to have made the Puritans, and the cross, Christ. War has been invoked to clarify the philosophical sluggishness of men. The rigidity of a frigid winter has been invoked to explain the advances of civilization. Be all this as it may, it does seem that the individual must "turn around" with Plato or experience the New Birth as Christ pronounced the necessary condition of eternal life to Nicodemus, he who came by night.

(3) TO BE A PHILOSOPHER OF THE NEW SCHOOL IT IS NECESSARY THAT ONE BECOME A MAN WITH ALL THE INNATE AND CULTURAL SIGNIFICANCE THAT THIS IMPLIES. WE MUST BECOME PHILOSOPHERS BY A NEW BIRTH. THIS INCLUDES THE IMPERATIVE TO LOVE WISDOM WITH ALL ONE'S HEART AND TO KNOW OUR NEIGHBORS AS OURSELVES. OUR NEIGHBORS ARE THE ADJACENT IN TIME AND SPACE, ANCESTORS, POSTERITY AND THE MICROSCOPIC ENTITIES ABOUT WHICH WE KNOW SO LITTLE. It is true that many perplexing contradictions and limitations will cause us to compromise much of the ideal program but these should be as few and as superficial as possible. Necessity should never be the mother of invention. War should not be required to set men aright. Sin is the great contradiction of the religious system. Punishment is the anachronism of the law. Eugenics should perpetuate a virility in men so that the struggle for existence is of little or no consequence. The new philosophy aims eventually to be entirely constructive. Yet man has not learned to perpetuate his wisdom and wealth through the third and fourth generation. Fluidity in his economic, moral, ethical and spiritual life, even the ills of the flesh and misfortune, have been interpreted as agents of uplift. Salvation through Fall

and Sin is not the essence of an ideal constructive philosophy. Nevertheless we do face a condition rather than a theory in the attempt to solve many problems and no one denies the value of a compromise that employs the mistakes and failures of life to direct us to success.

No matter where our laboratory may be, the observer must "carry" into it a "plan" of attack. No matter what age we live in, we "must decide" upon a philosophy. The flux of phenomena is so complex that any system that is employed to describe even a phase of this flux "must be selected." We have our "new birth" and a succeeding life of advance and compromise. No man of wisdom will assume that all the tattered remnants of the here and there of experience can be unified by a common philosophical system without an inner Faith, Wish, Longing, Desire or whatever other artificial appellation we may use.

(3) **First Aims.** We ask where are we to start? Upon what firm foundation shall we build? Which is the most proper philosophy for a Man? The answer is here and now. Adopt the best classification of knowledge that is available. The immediate problems on the frontiers of our experience are to be attacked first. The new philosophy is largely one of method. It is one of an outlined power of accomplishment that is supported by faith. We are to go down to the laboratory with an hypothesis. We are to assemble at the peace conference at Versailles with well thought out plans for the future. We are to be prepared for the great problems of life that are to confront us. Religion has been one method that we have employed for the solving of the complex problems of life. Optimism and hope are parts of the process but the content of the philosophy should be largely a matter of the understanding and the reason.

(4) A FIRST AIM OF PHILOSOPHY IS TO MAKE A COMPLETE INVENTORY OF EXPERIENCE AND ITS BOUNDARIES AND TO CLASSIFY THIS EXPERIENCE WITH THE BEST LANGUAGE THAT WE CAN DEVISE. THIS INVENTORY OF PAST KNOWLEDGE IS THE FOUNDATION ON WHICH TO BUILD THE SCHEME OF FUTURE OPERATIONS. WE ARE TO FACE EACH PROBLEM OF THE FUTURE WITH A PLANNED COURSE OF ACTION. WE ARE TO ANTICIPATE THE PROBLEMS THAT THE FUTURE WILL PRESENT. THE EFFICIENCY OF OUR LABORATORY EFFORT WILL DEPEND LARGELY UPON THE PHILOSOPHY THAT WE TAKE WITH US. Our language and our mathematics appear to have started along the Nile. The Chinese have developed differently. The

methods of the growth and development of our bodies and our minds go back ages beyond that of historical civilization and it is upon these accamplishments that fundamental human philosophy is to rest. The ants and the bees have their own chapter. Yet it is likely that the language of the woods and the waters speaks all the emotions of the human heart. Untold ages before all this, the cell had carried the ability to mold part of its environment according to some inner will and it is upon this unit that modern science frequently starts. The new philosophy asserts that we cannot fully develop a philosophy of life until we have completely traversed the structures of the objective world and determined their relations to the life entities. The problem of philosophy is much more than that of considering the relations of consciousness as we now feel them, it includes the certain cycle of that consciousness, that entity of life that swings between the man and the cell parts.

It is evident that a large portion of the inventory of philosophy is included in the language that it employs. It is evident that our present language is unable to permit us to speak with the living entities of Venus, the dead souls of our ancestors and our neighbor or even our constituent cells. To talk, to gesticulate, to grunt, to cry, to shout, to whisper, to command, to pray, to intimidate, to plead, to sing, to dramatize, to preach, to lie, to coax and to ventriloquize are all meaningless to the growing babe and to the soul on its death-bed. Our language has only a crude mechanical relation to the universal nerve language as it is developed in the higher animals. The nerve language is only a part of the language of life, a more universal form being that which permits the cells to communicate with one another and to evolve the plants and the animals that have populated the earth during the past millions of years. It is upon the fundamental language of life that the new philosophy is to be fully expressed. Soul is to speak with soul. A nerve of one life entity is to speak to the nerve of another life entity. We are to feel the radioactivity of atoms in our brains. We are to experience X-ray resonance within the subjective world. Objective phenomena are not to be censored by the eye and the ear as they have been. The intercell threads and the speech of the cell nuclei, chromosomes and genes are to be given their Rosetti stones.

The new philosophy is to represent the summation of all the "experiences," the observations and the conceptions of every entity in every conceivable laboratory position and this summation is to be expressed in the new language. The more or less definite aim to Uniqueness by the older philosophies is evidenced by their Assumption that there is but one kind of truth, space, one kind of time, morality, pain, pleasure, happi-

ness, joy and sorrow, one type of understanding, one process of reason and one ether. It is easily seen how all this unanimity may all be the result of the special macroscopic language that we use. Unless we employ a universal language our philosophy rests upon the same sands as have all the older systems. The speed of progress is now rapid. A few years ago the term thermodynamic entropy was acclaimed to be universal. Now we must broaden this term if we are to include the electromagnetic world, radioactivity and the ether. We may thus speak of a General Entropy applying to the Flux of the Objective world and Vital Entropy as applying to the Life Entity Evolution. (5) THE NEW PHILOSOPHY ASSUMES THAT THERE IS ONE LANGUAGE AND SYSTEM OF KNOWLEDGE AND ENTROPY THAT DESCRIBES THE ENTITIES AND THE FLUX OF BOTH THESE WORLDS. THIS ENTROPY URGE, THIS "METHODOLOGY" AND EXPERIENCE OF FLUX IS THE SOUL ENDOWMENT. EVERY FULL ORBED SOUL IS TO POSSESS THE POWER OF ACQUIRING THIS UNIVERSAL LANGUAGE, PHILOSOPHY, SCIENCE AND HISTORY, AND IS THUS TO BE A "PERFECT" ENTITY, CONTAINING WITHIN ITSELF ALL THE ULTIMATE ENTITIES OF THE OBJECTIVE WORLD. WITHOUT MEANING MUCH, IT MAY BE ASSUMED THAT THE SOUL EXHIBITS AN ETHEREAL AND AN ELECTROMAGNETIC QUALITY. Matter is also accused of being ethereal and electromagnetic. If the soul and matter entities are thus linked together it must be admitted that, in their evolution, there is a Missing Link vastly greater than that which rents the evolution of man and the lower animals. So General and Vital Entropy may be Linked together.

Eons before the Babel of Tongues that dispersed the races of men there was a Babel of the Languages of the Vital Entities when each Entity was Entombed in its protoplasm of clay, its mechanical world Penitentiary perpetuated through the evolutions ,only to be dissolved by the forces of death. The unity of the new philosophy is not to be the unity impressed by these conditions of imprisonment. We hold the faith that we shall eventually see beyond the Veil and that the Aim to do this constitutes a Fundamental Term in the Entropy Imperative of Man. Eternal Life has an important position in the Imperative. Faith in it built the Pyramids. The Universal attitude that modern invention has thrust upon man through transportation and communication is teaching that clan and nation habits, language and history are to be replaced by a human, and eventually by a life habit, language and history. The immediate problem of the League of Nations or-

ganization is to eradicate provincialism wherever this appears. Exaggerated local pride, customs and history and an undue local selfishness, isolation and ambition must be intelligently curbed. Babel is to become a Christian Union.

(4) **The New Philosophy as a Consistent Unified System.** It is not unreasonable to suppose that there might be independent and unrelated systems of philosophy. While we admit the universality of human nature yet other life entities, like the ants or the souls of the dead might have different experiences. Atoms may resonate differently to the same energy quanta. The soul that rides on the sunbeams of the morning might drink a Nectarian Flux that our souls color differently. (6) ALL MEN ARE EGOTISTIC ENOUGH TO CONFESS THAT THEIR DEFICIENCIES ARE DUE TO THEIR EVIRONMENTAL DEFECTS. EVEN THE BRAIN AND THE MIND ARE OFTEN ACCUSED OF BEING AT FAULT, SHORT CIRCUITED, AND THE RELIGIONS OF MEN USUALLY ASSUME THE FULLEST POWERS OF THE SOUL FOR THOSE WHO ARE SAVED OR GLORIFIED IN THE HEREAFTER. EQUALITY AND FRATERNITY ARE NOT PROBLEMS IN THE DEMOCRACY OF HEAVEN. EVERY PHILOSOPHER GIVES UNIVERSALITY AND UNIQUENESS TO HIS OWN SYSTEM. THE CHAPTERS OF PHILOSOPHY SUCH AS THE INDIVIDUAL SCIENCES ARE INVARIABLY ASSUMED TO BE SINGLE LAWED, UNIQUELY AXIOMED AND UNIVERSALLY APPLICABLE IN SO FAR AS THEY DEAL WITH KNOWN FACT. It is only in exterpolation that a unique philosophy breaks up into two or more parts. Contradictions came to the sailors of Columbus that assumed a flat earth; to the medicine men who called the Hosts of germs a single Demon; and to the materialists who have tried to interpret all phenomena in terms of mechanical analogues. Even many of the Unities of the past have been shown to be Exterpolations and this common error might be made a Parable like unto our Universal Failure to attain Perpetual Motion. The universality and unity of the new philosophy is of a different type, however, and our justification for it lies in such systems as the natural atomic scale and the common methodology of the life entities. (7) ONE AIM OF THE NEW PHILOSOPHY IS TO REDUCE THE NUMBER, AND THE NATURE OF THE ANTIMONIES TO THEIR MINIMUM. THIS INCLUDES THE REDUCTION OF THOSE ANTIMONIES (THAT PERSIST) TO THEIR ULTIMATE ENTITY CONSTITUENTS AND THE ULTIMATE ENTITIES OF FLUX THAT ARE RESPON-

SIBLE FOR THE DETECTION OF THE ANTIMONY. In lieu of the ability to use the universal language one might attribute all antimonies to the condition of exterpolation as introduced by our means of communication and our lack of knowledge. Philosophy must also be considered to contain the known as it adjoins the antimony. A few years ago "Natural Philosophy" included all the Natural and Applied Sciences, including the Branches of Engineering. This is the battle line that bounds No Man's Land. Because it is given a Multitude of Names does not make it any the less the Allied Hosts that continue to Progress against Anarchy, Doubt, Despair and Disaster.

(5) **Aggregation of Phenomena into Related Groups.** It is the common experience of each of us that if our philosophical consciousness emerges at all, it comes from a deep mist beyond the confines of which the laboratory and the observer have not yet penetrated. The reason that philosophies are individualistic may therefore be attributed to this condition. We thus come to know phenomena as ordered and classified. The landscape before our eyes represents the integrated activities of millions if not billions of rods and cones of the eye, the muscle fibres, the nerve and the brain cells. Our language, mathematics, literature, religion and philosophy are the products of the historical memory period of our individual life. That vital Designer of our cell colonies; that directive and ordering activity that emerges into mneumonic consciousness; that source of the imperatives or at least the integrated imperatives of the cell activities; that it is that seems able to order phenomena so that they constitute a seemingly objective world or they vary so far from it that we often feel that we have created an independent ideal world of Hegel, Fichte or Schelling. (8) BY CONTINUED APPROXIMATION THE OBJECTIVE AND THE SUBJECTIVE WORLDS CAN BE MADE AS INDEPENDENT OR AS CLOSELY RELATED AS WE DESIRE AND OUR SOULS AND LABORATORIES PERMIT. THESE CAN BE DEFINED AS LIMITS OR REALS IN SOMEWHAT THE WAY THAT MATHEMATICIANS DEFINE LIMITS. REALITY AND THE ULTIMATE ARE JUST AS MUCH FACT AND DEFINITION AS THE INCOMMENSURABLE NUMBERS SUCH AS THE RATIO OF THE CIRCUMFERENCE TO THE DIAMETER OF A CIRCLE.

The unity of the New Philosophy is based on this process of double approximation. We know Reality as an Approximation that can be continually extended and perfected by Observers and Laboratories. (9) THE PROGRAM OF THE NEW PHILOSOPHY ASSERTS THAT THE ULTIMATE

ENTITIES, THE BASIS OF ABSOLUTE VALUES IN THE OBJECTIVE AND SUBJECTIVE WORLDS, ARE TO BE FOUND AND RECOGNIZED "WITHIN" JUST AS ENERGY FREQUENCIES APPEAR TO EXIST IN BOTH WORLDS. THE MACROSCOPIC ENTITIES OF THE OBJECTIVE WORLD ARE TO BE RECOGNIZED AND UNDERSTOOD BY APPROXIMATION WHERE MUCH MICROSCOPIC DETAIL IS ELIMINATED BY THE UNDERSTANDING. THIS PROCESS IS ESPECIALLY ADAPTED TO THE MICROSCOPIC WORLD BECAUSE OF THE FEW ENTITIES THERE. Skepticism is to be answered by the skeptic being required to sojourn in the laboratory where the answer is to be found. (10) THE AIM OF THE NEW PHILISOPHY IS TO CREATE A UNIVERSAL OBJECTIVE AND SUBJECTIVE LABORATORY LANGUAGE. IT IS ASSUMED THAT THERE ARE ABSOLUTE UNITS, DEFINITIONS, RELATIONS, AN ABSOLUTE LANGUAGE, AN ABSOLUTE PHILOSOPHY AND AN ABSOLUTE ENTROPY OF FLUX.

This assumption is briefly illustrated by a map of equilibria, a natural atomic scale and the extinction of the macroscopic entities in the atomic world. The mythological Ethics, Rhetoric, Mathematics, Logic, Morality, Poetry and Art, as expressed by the ancient and barbarian phonetic ages of War, Alcohol, Cannabilism, Slavery, Competition and the Survival of Chance Majorities, will become a Language of Truth. Paradoxically Identity is born out of Difference and so our Newer Version, phœnix-like, arises out of the ashes of passion, hate, error, self-deception and ignorance of the action of the continuous Stream of Absolute Imperative. In the spring time when the ice sheets melt or at the edges of melting glaciers one sees deep cut channels in the ice filled with small streams of water. By the higher temperature and the better heat conductivity of the water the small streams continue to cut yet deeper channels. So the stream of the vital imperative flows amongst the equilibria systems of the physics-chemical world ever cutting deeper fissures in the otherwise solid pact of lifeless flux. Far, far away across a sea of ether, a vaster Flux is making possible these water rivulets in the ice. What the Sun is among the countless streams of visible flux among the material systems we can vision God to be among the invisible and hidden imperatives that constitute the Entropy Forces of Life.

## A MAP OF EQUILIBRIA.

The Architectonic Imperatives of the Subcell Entities Unified by the Life Unity Urge.

Toxin, Hormone and Vitamine Equilibria.
Heredity, Instinct, Intuition.
Display of Macroscopic Purpose.
Will, Design and Individuality.
Freedom and Independence, Life Entity Aims.
Spontaneity and Continuity of the Life Stream.
The Grand and Standardized Harmony Goal as Realized in the Cell Unity and Life.
The Architectonic Imperatives of the Cell Entities Unified by a Higher Life Unity Urge.
Many Equilibria such as Heart Action.
Cell Language, Nerve and Brain Cells.
Direction of Cell Colony Growth.
The Functions of the Organs, Sense Stimuli Perceptions.
The Ethics, Morality, Civics and Duties of Cells.
Cell Entity Aims.
The Christlike Social Democracy as Realized in the Cell Colony Life
The Imperatives of the Plant and Animal Entities as Directed by the Life Urge.
The Food, Temperature and Shelter Equilibria.
Plant and Animal Languages, Memory.
Species Evolutions. A Higher Life Program.
Freedom, Migration, Ecology, Animal Societies.
Physical and Chemical Forces.
Microscopic Entities of Natural Selection.
Automatic Cause and Effect Sequences.
Standardization, Interchangeability of the Entity Parts, Environment Entity Means.
Continuity of the Energy Flux.
Molecular Complexes.
Electromagnetic Phenomena.
Laws Directing the Chemical Reactions.
The Phase Rule, Crystal Growth, Sense Stimuli.
Laws of Gases, Liquids and Solids.
The Environment as a Means.
Earth and Planet Surface Conditions.
Air, Earth and Water Equilibria.
Planet or Geological Evolution.
Earth Soils and Plant Debris, Climate.

The Higher Sociology and Consciousness as Realized in Man and his Organizations. The Absolute Imperative System, Exemplified by the Life of Christ and the Exterpolated Unities and Philosophies of Men, and now poorly understood in our Higher Life Unity Urge. The Invention of History and All that it Records. Accidental Geological History. The Birth of Philosophy. Conversion as the First Step to Soul Power. The conscious Control of Equilibria. The Absolute Imperative as the Universal Will to Direct All Equilibria in Harmony with the Philosophy of the Imperative, an Allegory Illustrated by the Principle of Least Action in Mechanics, Entropy in Themodynamics, Progress as shown in Life Evolution and History, the Phase Rule and the Law of Mass Action Operating among Chemical Equilibria or the Lives of Service of Cells in the Cell Colonies. The Absolute Imperative Directs the Life Urge towards God and the Purpose of its Philosophy is to Describe its Operation and its Goal! God is some Harmony and central force of the Life Entities in their Aims and this Harmony of Aims is to be secured through the Action of a Systematic Application of Inner Imperatives Employing Objective Equilibria as a Realm of Means. The

systems through energy quanta and frequencies, electrons, atoms, molecules, colloids, crystals, living organisms and the more macroscopic bodies appear as parts resulting from periods of long evolution which in itself applies a certain amount of "soul," teleology or design. Atoms are viewed as stable because of certain inner structures. The order of nature not only includes the plants and animals that are often endowed with Leibnitzian monads, Drieschian entelechies or the Bergsonian élane vital but it also includes those systems described by the phase rule or the laws of radioactivity. The great Missing Links are the introduction of the self perpetuating and multiplying systems of life and the development of conscious teleologies that lead to memory and history.

(6) **The Word Assumptions and the Exterpolated Unities.** Every use of a word, a number or a symbol involves an exterpolation. It is only the minuteness of these exterpolations that permits of the existence of stable languages and values. Let the exterpolation be subject to accidental change or manipulation and large fluctuations are introduced and one will see the chaos that results. An example of this is given in the currency of a country. Introduce a large amount of paper money and values cease to be stable. Exterpolations become pronounced and the modern complex world of values, economically, undergoes a revolution of intricate transformations. Many artificial equilibria should be fluxed so as to urge men to the absolute. Suffering and death may serve this purpose in the absolute imperative program.

Every word that is used, in other than a specific application, carries an exterpolated meaning as every specialist well knows. There is a vast degree of difference in the meaning of the word Is in the following expressions: the tree Is: Albert Is: the electron Is: the quantum of energy Is; Man Is; time Is; space Is; the ether Is: Christ Is: memory Is: God Is. The word Being has a different meaning in each of these cases and it is interpreted in terms of our experience. The more a word is used the more meanings it has. A specialist becomes exact as he increases his language. If we have never had any laboratory work in physics the Is in the expression, the election Is, carries little meaning except as we exterpolate and suppose that this Is is the same perhaps as the Is in the expression, a clod of clay Is. In that case the exterpolation involves the assumption that we can see and feel the electron. (11) THE EXTENT OF EXTERPOLATION VARIES DIRECTLY AS THE DEGREE OF GENERALIZATION. Terms are therefore exterpolated more in philosophy than any where else because they are here most highly generalized. (12) WORDS, SYMBOLS AND EXPRES-

SIONS MEAN ONLY WHAT OUR GENERAL LABORATORY EXPERIENCE INCLUDES.

The fairy land of Exterpolation that we find in Electricity, Honor, the Infinite, Habit, Love, Faith, Principle, Duty, Dignity and Immortality is due to our Imprisoned souls being able to communicate with each other only through a Macroscopic Mechanical world about which we know little. We cannot carry the ideas of four hundred million different Chinamen in our minds when we speak about conditions among this people. A unit weight of gas is treated as a unit and not as billions of billions of billions of electrons and positive nuclei. It is, however, clearly the problem of philosophy to know what is lost, and why, during the process of exterpolation. (13) ONE OF THE PROBLEMS OF PHILOSOPHY IS TO DETERMINE THE JUSTIFIABLE EXTERPOLATION IN GENERALIZATION. Philosophy treats of the boundaries of knowledge and includes the problem of determining the best symbolism for describing these boundary conditions. The earliest systems of Philosophy were the most abstract and exterpolative. The New Philosophy includes all of the old philosophies that were not exterpolations with a Provisional Laboraory Program for the Immediate Future.

There is exterpolation in our language; in the operation of the vocal chords; in the transformations that take place when the sense stimuli are changed into nerve currents; when these currents are changed into sensations; and when these sensations are again made over into perceptions and conceptions. Until men can make and operate artificial sense organs, nerves and mental processes we will not fully appreciate the extent of these exterpolations. Until we can control Death and the soul can oscillate beyond its boundaries we do not know our inner hearts. (14) THE ONLY PROPER EXTERPOLATIONS ARE THOSE STARTING WITH NATURAL PRINCIPLES AND PHENOMENA AND THE MOST PROPER LANGUAGE AND VALUES ARE THOSE BUILT FROM THE NATURAL ENTITIES BY THE NATURAL WAY. Until we can reproduce the exterpolations that are natural it seems preposterous to imagine that there can be artificial systems produced to accurately replace the natural ones. (15) THE IMMEDIATE LANGUAGE OF PHILOSOPHY IS COMPOSED OF AN ALPHABET CONSISTING OF THE SOUL, THE ELECTRONS AND THE FLUX THAT RELATES THE OBJECTIVE AND THE SUBJECTIVE WORLDS. Ought there not be light words as well as phonetic words? Can we not have energy quanta, x-ray, electric current and molecular words? Surely Galvani, discovering the twitching of

the nerves of the frog by electric currents, would have expected an electric nerve method of communication to be more feasible than wireless telephony. In order to rescue freedom, it is necessary to eliminate ignorance, especially the deceptive ignorance that lurks in exterpolation. Superstition and historical traditions and rituals are small chapters in the grand panorama of misguided and misunderstood exterpolation that ever bounds truth and wisdom. Our whole Life in this mechanical world is one Great Extravaganza of Exterpolation whereby each soul of us is utterly penned in its skull of clay; given a few years of experience by his Monstrous Materialistic Jailor; permitted to see the Mastoden World through five small window gratings of matter filled with billions of billions of billions of molecular messengers that distort the view of things in a way we cannot tell; and allowed to give his heart to his fellows only after it has been converted into nerve currents, churned by the organ bellows of the mouth, listed wheresoever the air willeth and then be similarly censored by the ear drums and nerve fibres that run into the prison cells of our fellow soul. What does Freedom and Dignity and Life mean to such prisoners Blindly Born to be Cut Down as Grass by the Reaper Death? Every man that refuses to throw his Life with Philosophy in the Struggle for Freedom, for Language, for Thought, for Soul Communion and above all, for Life and its Absolute Imperative, is not worthy of the name of Man. He is but the Clod of Clay without his Birthright, an Animal of the Field.

(7) **The Natural Atomic Scale.** The methodolgy of science consists in differentiating phenomena into "parts," "individuals," independent "entities," isolated centers, regional disturbances and periodicities. The atomic parts are related to each other by the Laws of science. Each science has more or less of a characteristic scale of atomic and law classification. Zoology defines the process whereby animals are classified, botany the plants and psychology the subjective world. It is the aim of the new philosophy to fit the scales of the various sciences into one unique and fundamental scale. It is here that is exercised the common faith of the great thinkers of all time. Practically all philosophers assume a unity in phenomena that partakes of this character.

The result of the mechanical philosophy was to classify the whole objective world in terms of the units of Length, Mass and Time or Space, Inertia and Frequency or Foot, Pound and Second or Centimeter, Gram and Second. Many attempts have been made to isolate natural entity units of the above type without success. The negative attempts to accomplish this goal are expressed by the hypothesis of physical relativity

that the metric properties of space and time form a continuum whose structure cannot be broken into parts. In other words it is asserted that a length cannot be measured by itself but must always involve time. This condition arises because a Length is always known subjectively through one of the senses and in the laboratory this sense is sight. The result has been that the objective world is spoken of as the visible world: the world of size or magnitude: and it follows as a logical conclusion that this world must be made up of an invisible world that does not possess Size or Magnitude for the obvious reason that the eye or any other sense organ operates macroscopically, so far as sensations go, and therefore visibility as a sensation is macroscopic. The microscopic and subjective world is not one of Magnitude and Size therefore. It is proper to classify the macroscopic part of the atomic scale according to size because the unities of this part of the scale are exterpolations obtained by the ommission of certain microscopic data. It is altogether scientific to speak of the direction and magnitude of the pressure of a gas although a pressure is simply the summation of a large number of impacts of the gas molecules striking a surface in all conceivable directions, an intercommingling of electromagnetic fields.

The atomic scale is to be considered as "Absolute." No species of entities of the scale can be confused with another species. The entities of the scale are Absolutely Positioned in the scale. No transformation will produce a natural entity except a natural change employing natural constituents. There may be a number of natural processes or the natural transformations may be rearranged in a number of ways but no natural entity is created or annihilated by artificial methods. The very flux or the energy that informs the subjective world of the external phenomena is conserved and the law expressing the Conservation of Energy now supports the whole fabric of metric knowledge. It follows that the ultimate entities are conserved. It would appear impossible to know the external world excepting as the entities of this world flow into the soul and are felt Internally by it. Presumably electrons and energy can flow through the nerves and we would be lead to believe that these entities comprise the structure of the subjective world. The Containers of energy in the objective world must be experienced in some manner by the soul else they would not be knowable. It is the external and the visible world that is essentially macroscopic.

The relations between the entities of the structures "change" in "space" and "time." In the external world a description of this flux is made by terms such as entropy, radioactivity, sorting agents, the phase rule, chemical reactions

and natural selection. In the inner world we speak of imperative, desires, love, wishes and duty. The province of philosophy is to assume that there is one single and unique series of these impelling forces and this will be spoken of as the Entropy Imperative. The general method in science is to assume that there is an equilibrium and that in the macroscopic world many of the microscopic entropy imperatives are in invisible operation. Our bodies are spoken of as mechanical hearts, air pumping lungs, chemical stomachs and electromagnetic nerves. Viewed in this way we neglect all the individualistic processes in the lives of billions and billions of cells. The natural atomic scale therefore includes a classification of these imperatives. The result is that in the soul the unities such as space and time dissolve away as the artificial terms world and water, to be replaced by the microscopic entities. The macroscopic Principles also dissociate into integrations of the relations that involve the ultimate entities, the structures of the ultimate equilibria. The unfortunate condition of science and the imprisoned soul is that it studies the microscopic world macroscopically. Alpha and beta particles can be studied because they contain so much energy. Death is evident because so many cells are affected. The nuclei of the atoms are detected because they exhibit the presence of such intense forces. Above all the soul is "I" because it is the center of the All for each and every philosophy. In other words as part of our structures become microscopic other parts appear to become correspondingly macroscopic. There is a condition in knowledge where entities appear as chains of equilibria, "I" always being in the chain. It might therefore be concluded that an Absolute microscopic world does not exist. The equilibrium of the Large and the Small is included in our conception of the soul, as being the most microscopic of all,and the existence of cells,chromosomes and genes. The idealist proposes the Allegory of the Creation of the non-soul by the soul and the resultant origin of Differences as the basis whereby Identities and Recognitions may arise. In a later stage of the Creation is evolved "I think therefore I am" and "I am I," because I am not the not-I. This Traditional "In the Beginning" neglects the imperatives and methodology that directed the growth of the brain and the body. The new born babe even is almost entirely ignorant of the sense language and our artificial language is utterly foreign to his philosophy. It is the philosophy that precedes the development of the body, but that is none the less vital, that will ultimately lead the way to the ultimate and the absolute. It is in the sense that the knowledge of the soul must come through the senses and the nerves that we may say that there is "nothing new under the sun" and that the experi-

ences and the quality of " human nature is the same," in bulk lots presumably. All knowledge thus involves a condition of relativity that not only includes a complex mechanical laboratory but the nerves, senses and other physiological parts. Until these transformation processes are made metric and their structures are controlled and understood, man is but little higher than the animals. Conversion to philosophy and the test of citizenship should require the conviction to the new philosophy as a fundamental imperative of all parents. If the world is to have a League of nations power must not be consigned by numbers but by some philosophical process. Herein democracies have been found wanting. No real democracy can exist until philosophy has defined a Citizen and this must be done in terms of imperatives rather than in the ability to read a constitution. One ever recurring problem of the new philosophy is to isolate the parts of the entity chains. The isolation of a negative election (E) or an imperative such as love (L) involves a positive electric field (P) or a contradictory imperative by comparison (hate, H), the use of laboratory apparatus (Telescope T, or an animal A that exhibits love), our own sense organs S, nerves N, the process of sensation X or entrance into the subjective world, Perception Y and Conception Z. (16) AN AIM OF THE NEW PHILOSOPHY IS TO BREAK UP THE CHAIN EPTSNXYZ INTO ITS ENTITIES, TO KNOW THE EXTENT TO WHICH THESE CAN BE REPLACED AND TO POSITION THEM IN THE ATOMIC SCALE.

The Cartesian philosophy took the synthetic point of view and assumed that the Finite was but a portion and therefore a partial and imperfect representation of the Infinite. The Finite is therefore Abstractive, Indeterminate, Negative. Nothingness and Unreal. To attain Truth they said that it is necessary to abolish Figure, Number, Time, Space and all Entity Structures and thus would we Reach the Absolute; the God of Spinoza. Man is to conquer himself by abnegation into Nirvana. This philosophy is an Exterpolation because it heralds its very birth in the Entity Philosophy that " I Think therefore I Am." It assumes the very Entities that the Principle of Equilibria hesitates to assume when it starts with the " Creation " of " I Am I." The Entity Philosophy does not deny Nirvana but it does declare it to be one of the Exterpolated Unities and that the Reals are only those Entity chains. How can we comprehend the Exterpolated Unities when we do not know the entities that constitute their structures? The atomic philosophy condenses the flux of Phenomena into centers or quanta without spatial magnitude and assumes that the " ordering " of these quanta is interpreted by relations involving such macroscopic words as time (cause

and effect) and space (direction). All beyond the " relation " of " order " is " void " of " order " or nothingness. " Penetration " or " interpenetration " relate to space and time, are macroscopic and do not apply to energy. Just " how " the atomic philosophy is to " explain " the relation of energy that gives the " cause " " effect " ordering (frequency relations or resonance), or how the quanta can " differ " subjectively so as to give the multitude of " directions " are classic problems.

The supposed discovery of the Object Subject or the Subject Unity or Difference in the I Am I and I Am Not the Not I is to be compared with the E Is Not P or the P Is P. Identities, Differences, Positives and Negatives appear in the earliest dawn of the recorded consciousness of memory and remain as basic operations of the subjective world. Thus the idea of Positive and Negative Electricity, Directions in Space and the Opposing Forces that Determine the Equilibria goes back to the Prehistoric ages of our Soul's Activity. It is this Return to Ancient Ritualism that may make us fear that the New Philosophy is but an old Phantasy, in a New Parisian Fashion. But Optimism comes in the visions and the advance that the Entity Philosophy is making into the very inner recesses of the objective world. We see a new Nerve Language free of Space and Time as Independent Variables. A New World is to be Ushered in when this New Language replaces the Phonetic one. Materialism will disappear. This will mark a big step in Releasing the Soul to Free Expression. This step is the omen of faith in the New Freedom. The confusion that the absolute is being and Nought or Heaven and Nirvana is refuted by the condition that the Operation of the Absolute Imperative is not Cyclic but Progressive like Entropy. To say that the Cycles are only Infinitely long is to use Time and to Exterpolate.

The narrow vision of the older philosophers was due to the small portion of atomie scale that they knew. Solomon only knew the D, E, F. N species; Haeckel the E, F, G, H, N species; Hegel and Fichte do not travel much beyond the N group; Newton considered only the low velocity world; realism and mysticism seldom travel beyond the world of the layman and it is only recently that the high velocity world has been opened to exploration.

THE NATURAL SCALE OF ATOMIC ENTITIES WITH THE FAMILIES OF MATTER SYSTEMS. CYCLIC WAVE STRUCTURES, LIFE FORMS, FORCE FIELDS, EQUILIBRIA, ENERGY QUANTA AND PSYCHIC STRUCTURES AND SOUL AWARENESSES

Electromagnetic Universes of " curved spaces " such that radiation does not escape. Theoretical diameter 1000 million light years.

A. The Ultimate Synthesis. The Ether Energy Condensation. Sidereal Astronomy and the Equilibria of Galactic Systems.

B. Star Clusters and the Spectroscopic Evolution of the Suns. The Upper Limit of the Gravitational World. Radiation Pressures.

C. The Gravity Equilibria of Sun and Planet Systems. Mathematical Astronomy and Gravitational Evolution. The Einstein Gravity Light Effect. The Death of Suns by Radiation.

D. The Surface Phenomena and Equilibria of Suns and Planets. Meteorology, Geology, Minerology, Geography. Thermodynamics. Gravity and Thermal Equilibria.

E. Life Groups and Natural Selection. Biology, Botany, Ecology, Zoology, the Humanities, Civics, Morality, Ethics, Religion. Sound.

F. The Life Individuals, Physiology. Organic Equilibria as Heart Action, Respiration, Digestion, Life and Death, Nerve Waves or Electrolytic Effects, Thermostatic Reactions, Germ Warfare, Toxins and Antitoxins. This World grades into the Cell Structures. The Lower Limit of the Gravitational Structures.

G. Cells. Bacteriology. Medicine. Chemical Reactions. Electrolysis. Upper Limit of the Electromagnetic World.

H. Mind and Inner Cell Structures. Psychology. Heredity. Mental or Psychic Language. The Region of the Arts, Humanities and Music as these Amalgamate with the Objective World.

I. J. Chemistry. Radioactivity. Molecular and Matter Atom Equilibria. The Lower Limit of the Material World. The Disappearance of All Mechanical Apparatus and Mechanical Laboratories.

K. L. The New Physics. The Electromagnetic World. Electrons and the Light, X ray and Gamma ray Worlds. The Lower Limit of the Visible World and its Disappearance into the Invisible World Structures. The Almost Eternal Equilibria of Negative Electrons and Positive Nuclei. (It is commonly asserted that there is but one kind of negative electron and one kind of positive nucleus.

L. M. Force Field, Ether and Energy Structures. Limit of Objective Time. Energy Structure Equilibria. Probable Region of the Ultimate Entities of the Physical World. The Limit of the Space World.

N. Seat of Recognition, the Understanding, Reason and the Will. The Blending of the Objective and the Subjective Worlds. The Source of Teleology in the Control of Equilibria by the Will. The Realm of Ultimate Subjective Entities. The Home and the Immortality of the Soul. The Region of the

Ultimate Antinomies. The Time World Disappears in the Synthesis of God and the Immortality of the Ultimate Entities and the Immortality of the Soul.

## THE COMPLETE EXTINCTION OF MACROSCOPIC TERMS IN THE LOWER MICROSCOPIC REGIONS

The Ultralaboratory Macroscopic Region of Pure Space. The Boundaries of Space.

A. B. Upper Region of Gravitation. Region of Light Ripples in the Gravity Shoals. The Non-Euclidean Character of Space as Definied by Light Lines. Upper Region of Equilibria and the Visible World.

C. Region of Kepler's Laws. Distortion of the Orbit of Mercury according to the Theory of Relativity.

D. The Boundary Phenomena of Planets.

E. Species. Only Region where Groups of Living Entities Exist.

F. Individual Plants, Animals and Cells. Only Region where Left, Right, Color, Taste ,Language, Sound, Smell and Muscular Gravity Forces are possessed of Meaning.

Lower Limit of the Equilibria of the Bodily Organs of Plants and Animals, of Cell Colonies and of the Natural Laboratory Apparatus resulting from the Ages of Evolution.

G. Cells and Cell Structures. Limit of the Mechanical Phenomena in the Subjective World.

H. Probable Region of Nerve and Brain Phenomena. Region of Vital Equilibria in the Electromagnetic World.

The Region of the Extinction of all Mechanical Laboratory Apparatus such as Clocks, Rulers, Compasses, Telescopes, Microscopes, and the C. G. S. Units. Up, Down, North, South, East and West, Hard, Soft, Sunset, Sunrise, Sensation, Death. Mechanics, Length, Instant, Substance, Solid, Liquid, Gas. Contraction, Expansion, Hydrodynamics, Thermodynamics, Scalar Temperature, Mechanical Vibrations, Entropy, the Phase Rule and Many Scalar Laws cease to be fully Descriptive of Phenomena. Many of these Quantities are rendered useless for the Laboratory.

I. Particles, Molecules and Matter Atoms. The Lower Boundary of the Conservation of Mass and of the Newtonian Mechanics. The Lower Limit of the Application of the Laws of Motion of Newton, of Mechanical Force, Acceleration, Mass, Impact, Collision, Momentum, Gravity, Vector Temperature, the Absolute Zero of Temperature, Mechanical Attraction, Repulsion, Mechanical Action and Reaction, Black Bodies and all the Scalar Laws of Radiation depending upon Scalar Temperature and Mechanical Surfaces.

J. The Ninty Two Matter Atoms. The Lower Boundary of Materialism and all terms based upon the Philosophy of

Materialism. Region of Null Point Energy, the Stark and the Zeeman Effects. The Lower Region of the Natural Number Systems such as those of Moseley and the Coefficients given in the Radiation Line Laws of Ritz and Balmer. The Region of Matter Atom Disintegration. Limit of Mechanical Space and Time Concepts, Form, Shape and Magnitude.

K. Free Electrons and Positive Nuclei. The Lower Boundary of the Visible World and of Points. The Lower Region of Kinetic Energy, Harmonic Motion, Attraction and Repulsion, Equipartition of Energy, Radiation Pressure, Restitution Force, Instants of Time and of Known External Relations that will serve as metric units. The Lower Limits of Present Metric Laws.

L. The Force Fields and the Ether. The Invisible World. The Einstein Light Gravitational Effect. The Lower Boundary of Potentials, Potential Energy, the Maxwell Equations and the Relativity Theory. The Lower Limit of a Four Dimensional Space.

M. Energy Quanta. Planck's Law. The Lower Limit of the Objective World and its Equilibria.

N. The Stream of Conscious Equilibria. Recognition Understanding. Reason. Desire. Will. Freedom.

The Pure Unidirectional World. The Soul Awareness as the Entropy Director of All Equilibria. The Stream Of Ideal Destiny Flowing to God.

The Infralaboratory Miscroscopic World beyond Unidirectional Space.

(8) **Features of Atomic Structures and Vacuoles.** (17) THE REASON THE OBJECTIVE WORLD IS MORE CLEARLY CLASSIFIED THAN THE SUBJECTIVE WORLD IS DUE TO THE FACT THAT WE ONLY KNOW ONE LABORATORY FOR THE STUDY OF MENTAL PHENOMENA AND THAT IS THE ONE IN WHICH OUR SOUL WATCHES ITS OWN MIRRORED IMAGE BY INTROSPECTION. OUR SOUL IS UNABLE TO ISOLATE AND INDENTIFY TWO ENTITIES WITHIN BECAUSE IT CANNOT "FULLY" CONTAIN MORE THAN "ONE" ENTITY AT A TIME AND ITS CONTENT IS IRREVERSIBLE. These are the apriori powers of consciousness. A "Desire Is" is a content of the soul. Later another "Desire Is." These "Is" words are different. They pertain to chains of equilibria. The degree of "Isness" may be vastly Different. One may be the mere Fleeting Shadowy Mist of a Desire just at the edge of the Subconscious while the other may blaze and burn a perpetual trail down through the stream of consciousness, it may be a murder that Will Out. In the objective world, so far as we

know, one " electron " " Is " " exactly " the same as another " electron " " Is," the " electrons " are " Interchangeable " in every way and " Is " remains invariant. It is this exactness that marks our approach towards the ultimate entities and an ultimate language.

In the macroscopic series this exactness of description is not applicable. Either an atom, a molecule, a cloud of mist, a stone or a swarm of dust may be a planet revolving about the sun. Indeed the possibility of electron planets may be employed to test if the electron is subject to gravitational attraction. A molecule planet Is defines Isness very different from that of the Venus planet Is. In the former case Radiation largely determines the planet Is, in the latter, gravitation. In the macroscopic world generalization is always accompanied by the Exterpolation of our language. (18) IN THE MICROSCOPIC WORLD OF ULTIMATE ENTITY LETTERS GENERALIZATION LEAVES LANGUAGE WITHOUT EXTERPOLATION. IT IS FOR THIS REASON THAT THE NEW LANGUAGE OF ATOMISM PROMISES AN EXACTNESS THAT NO ARTIFICIAL TONGUE CAN ATTAIN.

Why the lower series of entities should be finite, and why the number of terms should be so small, we of course do not know. Why there is but one negative electron becomes one of the great problems of metaphysics. (19) THE SIMPLICITY OF ULTIMATE PRINCIPLES AND ENTITIES EXPLAINS THE CHARACTER OF THE PRINCIPLE OF LEAST ACTION AS IT APPLIES TO THE INSISTENCE OF THE ENTROPY IMPERATIVE FOR SIMPLICITY AND UNIQUENESS, WE CAN ASSUME THAT THE IMPERATIVE TO SIMPLICITY AND UNIQUENESS ON THE PART OF THE SOUL IS A MANIFESTATION OF ITS RESONANCE WITH REALITY.

In the realization of the miscroscopic imperatives of life it will be noted that the unities of conscious sense perception are crude compared to the structures of the parts that carry heredity. Only the eye carries us into the minute frequencies of energy quanta and the development of this organ is one of the greatest of the accomplishments of the Imperative of the Life Urge. As the eye is but the means of information to the soul it follows that this itself is electromagnetic, especially as the nature of nerve transmission is electrical. If the soul is to experience all phenomena, it is necessary that it Contain or Feel the electrons and the positive nuclei, or the entities of which these are composed if they are complex. Otherwise it follows that there are certain vacuoles in the experience of the soul that can never be filled by direct experience and the universal faith of scientific philosophy is that all phenomena

are " capable " of " being understood." The statement that the soul may " Contain " or " Feel " electrons is to be taken in a general sense. The Assumption that the soul can experience all phenomena is also to be taken as a general expression. It is not essential that it shall be in resonance with macroscopic phenomena. The lead atom emits and absorbs characteristic spectra including x radiations. The soul is not supposed to be atune with these frequencies. But the lead atom is generally conceded to be a Macrocosm of simpler entities. It is these ultimate entities that the soul is assumed to be capable of feeling or understanding directly.

(20) IT IS ASSUMED THAT THE VACUOLES AMONG THE MICROSCOPIC ENTITIES ARE REAL IN SO FAR AS WE HAVE EXHAUSTED THE OBSERVER LABORATORY METHODS FOR THEIR DISCOVERY. THESE VACUOLES ARE NOT TO BE ATTRIBUTED TO VACULOES IN THE POWERS OF THE SOUL. It may be contended that the poisons, the toxins, the venoms, the alkaloids and death arrogantly define the boundaries of our experience beyond which understanding cannot penetrate. These may be pictured as the abysmal depths and the bottomless pit vaculoes that are unexplorable. The atomic scale in this allegory may be the Harmony of Heaven and the Vacuoles are the Cauldrons of Hell.

One answer to the situation is to come with our Victory over Death. Some would view Death as Annihilation, the Boundary of a Vacuole. Most of us cannot conceive of Annihilation. Vacuoles are absolute and Immortal Voids. Likewise ultimate entities are immortal as regards their " invisible " and " externally " unknowable structures. Physical philosophy now pictures the universe as a matter vacuole, containing only electrons and a velocity vacuole exhibiting only the velocity of light.

(9) **Analysis and Synthesis.** The present state of atomic philosophy shows the wonderful simplicity of structure of certain quantities such as electrical charge and the complexity of the electromagnetic frequencies and the energy quanta. There is also displayed the philosophical tragedies inherent in the atomic method. The visible and the material are indicated to be macroscopic, " mild " and " diffuse " and are Explained away in terms of the " Invisible," the " Immaterial," the " Intensified " and the " Concentrated." Phenomena are reduced to a flow of energy quanta between negative electrons and the positive nuclei Positioned as Electrical Specs in the Vastness of the Sea of Ether. These Specs are veritable star points in the abyssmal depths of space.

This very Vacuity of space and the Independence of the Electrical Specs and their supposed Invariancy Magnifies the Problems relating to their "Connections." This condition is the Great Paradox of the Atomic Philosophy. The terms "Action at a Distance" and "Contact" involve just as great problems though the terms seem more homelike to us. The methods of the new philosophy aim to reduce the number of these problems to a minimum. The great Synthetical laws that it supports are to represent phenomena in the same way that the unities of nature do. The Exterpolations due to philosophical generalization are to eliminate microscopic detail as accurately as they are Neutralized in the objective world. This is at least the goal. Synthesis is to be accomplished in the same manner as it is done in organic chemistry, by starting with the natural entities.

At one time a Great Synthetic Unity, such as God, was looked for as the forger of lightning in his furnace laboratory. But who would now look for the World, Honor, Democracy or Perfection, any more than the Infinite, in the laboratory. The views of the laboratory are atomic ones. God as the Goal of the Absolute Imperative of the soul: as Father; as Shepherd: as the Great Physician: as the Great Spirit: as the Personification of the Soul: as the Essence of the Beautiful: as the Creator: as the Governor of the Universe: as the Comforter: as the Just: as the Merciful: as the Wonderful: as the Monad of Spinoza: as the Container of the Objective and the Subjective; these are Creations that must be Felt within. They are not of the senses and the sense laboratory.

We may create God because He Created us. Our very Creation or Discovery of the Nonsoul permitted us to create or discover the soul. Like every Equilibrium the relations are mutual. Ordinarily the Equilibrium of the soul is with the objective world but when it is not, can we say rationally that "I Am I" means that the soul is in relation with itself? Is this not the condition of the Kingdom of God within and is not the Equilibrium "God Is I," or "I Am God," an Atomic Entity of the God Unity just as I feel a Color Energy Quanta is a relation with the objective world? Can we know more of God than is contained in this equilibrium? The Absolute Imperative arises from the Relation we have with God within. In a three or a four or an n-dimensional world we might picture the soul as surrounded radially by relations. But the subjective world is ordered by a unidirectional Inner Entropy. One way leads to God and the other to the World. To take the way to the world is to become a specialist and an automaton of the world. To take the way to God leads to Freedom and Manhood. The Soul is a growth directed by its own Entropy. It may make itself an automaton and a means or it

may secure Freedom in the Aim for it. Life itself is a "growth." Progress is the achievement of the Inner Aims by the life entities. Reversion is the Slavery that comes to the automaton. The meaning of idealism is difficult to express in terms of a mechanical world language. Our soul often becomes purified by suffering. It resonates with anguish when it sees its fellow soul agonize in death. It is thrilled with love. It is made sick by the selfishness, the greed, the pride and the arrogancy of its fellow souls. In its lonesome trail through life it is cruelly perplexed by paradox and finds its sole support in that "Great Equilibrium," its "Immortal Home," that "Being" that is as difficult and impossible to define by a macroscopic language as is our own I or Ego. (For the problem and the nature of a Personal God see Clement C. J. Webb, "God and Personality," The Macmillan Co.).

(10) **The Antinomies.** In all philosophies the discussion of the boundaries of knowledge involve contradictions, paradoxes, antitheses or antinomies. The atomic philosophy meets these difficulties when it tries to describe the properties and the nature of the finest entities that are known such as the electron and the quanta of energy. The Dilemma of the Antinomy is one of Ignorance and it is the Faith of all Scientific Philosophy that these can be reduced to a system of ultimate Antinomies, corresponding to the ultimate entities. It is in the moors and the fens beyond the laboratory that the bogland of the antinomy, with its sinking sands of discussion, doubt and despair engulf the philosopher.

He asks how the Relative can be conceived without having the Absolute to use in a comparison? What does the Whole mean if it has no Parts? Is there Equality without the possible condition of Inequality arising? Does the Positive exist without a neutralizing factor that is called the Negative? Can there be a God of the Soul without an outer Devil in the Environment to oppose Him? Do not Analysis and Synthesis go hand in hand? How can there be Growth and Progress for a "Being" or an Aggregate of Beings? Are men Merciful where Cruelty exists not? Does one define Democracy without referring to Autocracy? Is Love possible without our knowing and feeling Hate? Pride and Humility are companions in the same soul home are they not? Do we not always contrast the idea of cannon fodder with that optimistic revelation that "the very hairs of our heads are numbered?"

To many of us as specialists it seemed that science had largely resolved the antinomies but when we enter into the region of the ultimate entity structures we find their very home land. The laboratory is as full of them as the realm of human

nature. We associate Attraction with Repulsion: Rest with Motion: Action with Reaction: Positive Electricity With Negative Electrons: Laws of Chance with Laws of Motion: External Relations with ultimate Invariant Entities that cannot have knowable Internal Relations: the explanation of the Visible world in terms of an Invisible world: the Continous of the Laws and the Great Differential Equations and an Atomic Philosophy of the Laboratory: the Constant Flux in a world of Invariant Entities: the Boundaries of the Universe: very Spacious Force Fields of ultimate like entities such as the electron: the Finite and the Infinite: the Beginning and the End: Creation and Destruction: the impossibility of Creation and of Eternal Invariancy with a Perpetual Flux of External Effects: the Impossibility of Knowing an Invariant Entity or of Understanding the Causal Relation of one Effect following from a Different Entity as Cause.

Vast Visions vie to show,
The Real "relate." And so
Time "flies" some say. No, no,
Men's woe. Time "stays," men "go."

All's motion, some agree,
Kinetic energy.
'Tis wrong. Changeless are we,
Immortal do we be.

Yet "points" of view guide every scheme,
The True as Absolute does seem
When aiding "most" to See the Dream
Yet Concepts e'er Exterpolate,
Absurdest Limits hold Innate,
Earth Habits visions Macerate.

## II. THE PHILOSOPHIES AND THE RANGE AND VISION OF MODERN SCIENCE

(11) **Some Atomic Philosophies.** We are. We Think We Are. We Will. We Are Aware. We Recognize. We Feel. We See. We Hear. We Know. We Calculate. We See Entities such as the sun. We Feel Sensations such as pain. We Are Aware of Ideas. We Understand. We Reason. We Conceive. We Perceive. We Posit our own Souls. We Posit our Nonsouls. We are Free. We are in Bondage. We Discover. We Invent. We Remember. We Love. We Serve. We Create. We all enormously Exterpolate by never using "i" but I. We are Enormously Selfish. After all this Unity and Relativity, the essential condition long preceding the Soul. I, has been Growth, Growth that is part of a Continuous Thread of Life that can be imperfectly traced back through the ages. Would this not mean much more to us if we should conscientiously say and think "i?" We Posit the Nonsoul without and within. We Know the Physical and the Mental. the Objective and the Subjective. We Experience both the Outer and the Inner Nonsoul as Parts or Entities. Without Entities we could not Differentiate, Describe, Define or Explain. However diffuse the Boundaries between Entities may be (and they are invariably quite indistinct) could Consciousness Exist in Recognition, Understanding and Memory without an Entity Structure, a Panorama of Differences to be Discerned upon its Stream of Flux with, at least, a Landscape on its Banks. We might draw an Analogy with the Stream of Consciousness as a Continous Flow of Will to Live and the Memory that arises when the Soul has sufficiently Developed its own Subconscious Internal Willings so that it is Free to Watch the Shifting Scenes that Divide it from that which it Cannot Will. It may be the Resistance of these Barriers to the Will that Stimulates a New Epoch into Consciousness. It is this Relative Region of Relativity that Philosophy enters. Apparently you can start almost anywhere and Roll around the Circle. Exterpolation will take you any place that you may will to arrive. This is internally a Unidirectional World. a Line World if you are a Geometer, where both Ends are Posited at Infinity. No matter what the Line or what you do with it, you will always have the Antinomy of the Infinite or a closed circle curve. The Lines may be curved and broken in any manner of ways. There are as many Philosophies as

there are different kinds of Lines. A Straight Line is one upon which no Marking Points exist, one upon which there are no Twists, Bends and Corners, no Scenic Railway Tracks, where the Will is Thrilled and Thrown, Rolled and Jerked and Memory is fairly Pierced and Punctured by a Foreign Non-soul Environment that appears to Fate the whole Internal World to Dissolution.

The appearance of consciousness is accompanied by a continual Discovery, Analysis, Synthesis and Classification of the Entities. The problem of philosophy is that of Explaining Why Consciousness "Came," What it "Does" and Where it "Goes." How did the Subjective Entities come to be, How are they Related and Whence do they Go? Realism considers that the Mental World is the Exact Replica of the Physical World without its Corporeality. Idealism trys but fails to Explain how the Physical World can come out of the Mental World. To the idealist there are certain Categories that are A Priori. To Kant Reason was one of these. Materialism tries to make the Mental World dependent upon the Physical Entities of the Mechanical Gravity World of Matter. Philosophy may be dualistic or one of two types of monism. It may make its ultimate goal Soul and Substance or either one of these. Intimately related to Soul and Substance are concepts such as God and the World. Why does the Awareness of the Mind constantly persist in Exterpolations such as these? Why does it Build the Eternal, the Infinite and the Grand Unities far Beyond the Laboratory? Is not God as atomic as the world?

Each Isolated Soul Builds only with the Entities that it has within. The more of a Specialist a man is the more topsy turvy and whimsical is his philosophy. Aristotle considered Philosophy as the Doctrine of the Divine. Many Greeks looked upon objective phenomena as a World of Art. The Cartesians considered the interaction of body and mind as due to God. Spinoza made the objective and the subjective the attributes of the same Substance, Nature, God. Schelling called motion the Intelligence of God. The Reality of Freedom has been held to prove the Existence of God. Kant has conceived of God from Within and has held that to look for God in Nature is a Contradiction. Fichte pictures the Soul as a constructive activity. Fechner made the Soul a unitary spiritual process manifested in a unitary bodily process. The application of Entropy to such an activity is immediate. The idea of flux and equilibria also presuppose a Container for the Soul Activity (an invariant Abode). Wundt speaks of a heterogeny of ends for the various imperatives. The integration of these gives a harmonious whole as the summation of

the imperatives of the cells in our cell colony bodies is a single harmony. Wundt considered the moral order of the world to be the proof of the existence of God.

The dividing line between the organization (Aristotle), the teleology and the functioning of the life organisms and the "mechanical" nature of the lifeless world has long been made and applied in the laboratory. When Bacon said that science "must proceed as if final causes did not exist" he uttered a pragmatic truth of great immediate value because science has manipulated only in the gross mechanical world. Bacon's advice may be of equal value in the world of relativity and even in the electromagnetic world. The new philosophy leads us to believe that there is a microscopic world below these where souls do operate as final causes. But Newton is right in assuming that "bodies act as if there were no souls at all." Biology, however, asserts that "organization has finally become a category which stands beside those of matter and energy" (Henderson). There are the Quanta of energy frequencies, the Atoms of Matter, the Molecules of Matter States, the Masses of the Mechanical World, the Charges of the Electrical World, the Phase Systems of Willard Gibbs, the physiological organs and the plant and animal systems. Evolution operates all through the series.

We have the complex of "i," inside entities and outside entities. The Idealist founds his philosophy upon I, Ideas, Identities, Innate Willings, Reason, Understanding, Desires, Conceptions, Perceptions and Sensations. Many efforts have been made to devise an absolute classification to the Entities of this realm by assuming that certain of the Entities were Ultimate and that all the Others were Aggregations of these, Built by the Power of the Soul. Empedocles asserted that there are two types of Psychic Entities. Anaxagores visioned the world as moved by Mind Substances. Plato pictured a World of Eternal Ideas. Zeno and Aristotle analysed phenomena into Thought Forms. Spinoza pushed the explanation of phenomena back to a Final Substance. Leibnitz drew up a system of Monads that were self acting and perceiving. The Monads of Leibnitz were Soul Like Entities that were made to resemble the souls as we may imagine them to exist in the living plant and animal entities. The motions and the perceptions of the monads were two independent and concomitant series preestablished by the Primitive Monad, God. Wundt pictures the objective and the subjective worlds as two parallel lines that never meet or as overlapping coils of wire in which two independent electrical currents flow. Mutual induction here defines the unity. Psychophysics is assumed to connect the soul and the world in a like manner Those who, like Fichte and Schelling, imagine an origin for

consciousness and the soul, are confronted with the problem as to whether the objective world is produced by the subjective world or vice versa. Biological evolutionists always view the subjective as produced by the objective. Those philosophers of the idealist schools who look within (and because they can only look within their own souls) view the objective as the product of the subjective. These two views are spoken of as natural and transcendental philosophy. The entropy philosophy looks upon the flux of the subjective world as a continuous stream with its soul radiating and absorbing this flux (common also with the microscopic objective world) as an " invariant " entity.

Philosophers have frequently assumed that the entities of the objective world are basic and that the subjective world is some temporary Macroscopic Function Depending upon the underlying microscopic and basic structures of the objective world. This type of philosophy has always been materialistic and mechanical for the reason that science had never explored beyond the confines of the mechanical matter world. Words such as mental " Activity," when compared and defined in terms of the motion of the things about us, represents materialism. The idealists reverse this relation of dependence and make motion a function of the subjective processes. The triumph of modern atomic methods has included the isolation and the counting of the atoms. These are found invariant excepting as to the existence of isotopes and radioactivity. These atoms are shown to be electrical and not mechanical. The Water of Thales is replaced by the electrons of the laboratory and these are as real as our own physical bodies. The Moist Substance or Water, the Dry Substance or Earth, the Cold Substance or Air and the Hot Substance or Fire of Aristotle are given an atomic description. The essential feature of this atomic philosophy is that nothing is lost as one goes down into the microscopic world. Properties may be dispersed but they are not annihilated. The painting that was produced by the Inspiration of Rembrandt may be burned and its atoms scattered to the four winds of heaven but those atoms or their electron parts still remain. Likewise that Inspiration or the elements of which it was made are preserved although these same elements may be dissociated. In the atomic method some of the microscopic atoms are given Powers (that appear in the macroscopic world) as the directors of the equilibria that exist there. We feel that there were a few persons (perhaps one person) that directed, designed or could have designed the Great Pyramid. We picture the electron as possessing all the properties of any electrical charge no matter how large this may be. Of course the large charge can produce the lightning stroke but there is nothing electrically new

in lightning that we could not discover from single electrons and positive nuclei. In the same way we picture an entity soul in Rembrandt that contains the Inspiration Power of painting the Piece of Art that of course requires the macroscopic coordination of the billions of billions of cells and billions of billions of billions of molecules. The immortality of Rembrandt and of his Painting lies in this atomic Power and its Containing Entity in the Microscopic world. It is difficult if not impossible for the atomic philosophy to conceive these entities to be other than eternal.

Biological materialism is represented by a philosophy such as that of Haeckel. All life is represented by him to have originated from a single cell or mass of protoplasm, a Paraphrasing of the cosmogonies of the ancient Sumerians and Egyptians who assumed that mankind originated from a single pair. To Haeckel chemical action might be mental but he betrays his materialism when he assumes that the life entities originated Spontaneously. Behind the matter atoms he posited an ultimate eternal Substance and God was the energy of this. Sensation, will, love, desire and chemical affinity are the attributes of this Substance. Spencer considered that subjective affections are due to unknowable objective agencies. To him Force was the Ultimate of Ultimates.

The physical world is directed by certain fundamental Principles such as that of the Conservation of Energy, the Growth of Entropy, the Principles of Least Action and of Relativity. The Life Stream is also Coordinated by a Harmony and a Teleology that we but partly realize. There is here an evidence of the Operation of a Principle of Least Action in the Universal Aim of Man to Achieve as Simple a Picture of phenomena as possible, the Universal Will to a Unique Philosophy. The success of the sciences and the atomic theories indicates that some such Principle as this is common to both worlds. We might make God to mean a Harmony of Principles like that of Least Action. Surely the Greatest and Clearest Revelation that Man has seen is the Kingdom of God Within as it was lived by Christ. Man can never come to his full Estate unless he feels and lives the Kingdom of God that is within his own soul. Only then can he express that Dignity that is his. Before Pilate with his Temporal Power He can only express the Deepest Unconcern. It is true that the injustice of it all is harrowing because Revenge is natural now. Pilate paid the Penalty in his own time and has been the Scorn of the ages, notwithstanding that he may have been a "popular" man with the majority in his day. When people really become Christian the rebukes that a man such as Pilate will receive will be such a Punishment that the problem of Justice will not arise. The very absence of Justice now is the

result of the worldly souls of men. A million sins, such as dishonesty in the treatment of our neighbor Kingdoms of Heaven, are responsible for the Chaos that exists among the relations of men. Satan thus becomes very real when we think of him as the Tempter within, the Arch Plotter against the Harmony of one's own Kingdom of Heaven which one has so carefully developed and tended. The world, and especially the fiercely struggling human world is the paradox of the Christian.

As the Complexities of modern life envelop us, we have more and more need for that Imperative of the Principles of Least Action with a Maximum of Achievement that has guided the Stream of Life through the ages. It is the Establishment of the Kingdom of Harmony and of Heaven within that is the Absolute Imperative of Life. It is the Fortune as well as the Grand Temptation of Man that he has Inherited the Richest and most Glorious Kingdom in all the Realm of Life. According as he wills depends his weal and woe. The success of Life is to be measured by the extent or the failure in the establishment of your inner Kingdom, no more and no less. Immortal as we believe the soul to be, we conceive it to " grow rich " by its own methodology and design.

But you will say that you are an Opportunist and a Pragmatist. You aim to live upon a Plane that is Just a little lower than that of the Majority. You aim to be a Pharisee Lawyer that is just beyond the clutches of the active law. You are none other than Pilate himself. As Robinson Crusoe I would not want you as a companion in my Kingdom. Opportunism might impel you to " utterly destroy " my kingdom. My faith would trust many of the animals of the field first. You are Cain. The Glory of Abel has resounded for thousands of years. The Imperative of Cain and Pilate has been the Scarlet Blot upon their souls that the ages cannot wash away. No Kingdom of Heaven can ever contain such as these.

It is for this reason that every man must Be Born to the Absolute Imperative of the Kingdom. He must devote as much of his life as he can to see the Visions of the Harmony Principles: he must control the Equilibria that connect him with the Environment to the extent that this is in accord with his Dignity: he must aim to the Extension of his own Kingdom of Heaven and that of his neighbors; and he must prevent the Murder of the Absolute Imperative by ignorant self seeking men. As soon as men worship their Food, Raiment, Shelters, the Majorities and Selfish Egoism they Insult, they Sin and they Murder that which only can Save. The Parable of the Past as it is seen in the Records of the Rocks shows the action of the Absolute Imperative leading life up to the High Estate of Man. The Freedom and Idealism of Man is this

same Imperative that impels him to see and aim to be the Image of God. Knowledge and Wisdom are to Serve Men to permit of the most Perfect Functioning of his Absolute Imperative. Curiosity, Enthusiasm, the Desire and the Zeal that sends him to his Laboratory with a Program is an essential part of his Absolute Imperative. Knowledge and Wisdom are the Wealth with which the Absolute Imperative builds its Kingdom. But the mere Thrift of a France and a Germany may be but the Prelude to a Holocaust.

(12) **The Wide Range of Modern Scientific Discovery and Some Views of Evolution.** The extension of laboratory data beyond the direct action of sense organs is the result of comparatively recent efforts. The application of the Microscope and the revolution of medicine and surgery have taken place within a century. This is the region of the thousand diameters, of the magnification of the length of objects a thousand times and before the introduction of the microscope, the ultramicroscope and the interferometer, the smallest measurable length was that made by some instrument such as calipers. The smallest optically known thicknesses were those of thin films such as soap bubbles. Many scientists, until very recently doubted the very existence of molecules and atoms although the phenomena of chemistry were unintelligible without these assumptions. Seldom if ever did the older chemists deal with quantities of matter containing less than billions of billions of billions of atoms so that all the older scientists were acquainted with only macroscopic properties. The Electroscope, the Electrometer, the Phosphorescent Screen, the Vacuum Tube, the Galvanometer and other Instruments have made it possible to study isolated molecules, atoms, ions and electrons. The Grating, the Spectroscope, the Interferometer and delicate Balances and Electrical Apparatus have made it possible to study groups ranging from a few molecules, such as emanation gases, to those containing billions of billions of molecules. "Optically" by means of x and gamma ray spectra and interference, phenomena have been studied to the extent of millions of diameters. The older scientists dealt with Unknown Bodies of Unknown Size. Modern science deals with electrons and the positive nuclei of atoms that have a "diameter" of about a tenth of a millionth of a millionth of a centimeter. If the distance of the sun from the earth was taken as defining the length of a centimeter then the above .000,000,000,000,01 of a centimeter would be correspondingly magnified to some two centimeters. This extension of the realm of knowledge has included chemistry, biology, physics and astronomy and is rapidly being extended to all the experimental and the applied Sciences. Life forms five miles high

on the mountains, perhaps even on the moon, and six miles below the sea level are being studied.

When it is remembered that the past philosophies of the world had been built largely upon what the eye could either see directly or by the aid of crude telescopes and that the evolution of the physical organs for perhaps millions of years took place in this realm of knowledge, it is easily understood how revolutionary are the discoveries of modern science, so revolutionary that our language will have to be made over. This revolution takes a long time to filter down to the masses because it must largely take the form of technical and applied science such as engineering and medicine and transportation and manufacture and art and politics and sociology and economics before it reaches the common man and then it takes a very long time for the old philosophies to be eliminated. Men learn the New Knowledge as Specialists. In many ways mental inertia is a more pronounced Ponderable than is matter. The result is that large portions of the people of the world are living the philosophies of ancient days. Even the appeal of a religion such as Christianity finds these natural philosophies of the struggle for existence so deeply intrenched that its success is greatly compromised.

An epoch of great discoveries in any phase of human endeavor is invariably associated with a corresponding breadth and newness of vision, a deepness and sincerity in a fundamental faith and a fuller appreciation of the humble position that man occupies in the universe. Perhaps a versatility in the philosophies of men is a valuable stimulant for the exercise of the Will to Vision. Periods of stagnation in philosophical thought are times of comparative satisfaction with a parrot dogmatism that is shrieked, without redress, to the youth from the Throne Chairs of a superficial pseudo-scientific, economic and oligarcical caste. Even a period of great scientific discovery such as the present does not at all completely burn the bridges of the Rubicon and there are yet Tories that look back upon the philosophies of the Greeks, the axioms of Euclid and the mechanics of Newton and whatever is classical as the only Truth worth while. The philosophy that "We are Not to Know" is even now strong in certain phases of human endeavor such as in the great problem of life after death. Any effort to solve a problem such as this is hoodooed by the Tory and the Royalist. Eugenics is a stumbling block to the middle and lower conservative and unthinking classes. All in all, Environment usually succeeds in stamping out Vision and every philosophy of life should include a plan for fostering to the uttermost this spark of the Divine that inspires and cheers us in our relentless struggle with Environment. But for this bulwark of inner Euphoria many of us

would give up to despair in the dark dank waters of the ocean of stagnation. Philosophy should perpetuate Youth just as Surgery promises eventually to renew our Physical Bodies. Youth has the Hope of Transfiguring "Reality." It is the Sunrise of the Power of the Soul to drive away the Night of Ignorance. It has Faith in the Fundamental Imperative of the Soul. Old age is often the return of the relentless historical cycle, the despair that the failure to fashion our own lives, the ruling hand of environment and the fate of accident engenders. Great historical traditions bring the darkening hues of Sunset, the Mists gather and again the Night of Ignorance hangs over us. Death by the Environment has apparently swallowed the soul in its Victory.

The uplifting genius of vision has been in operation for a very long time and may have originated in those apparently blind forces that operate as the architects of our subconscious cell and gene lives. Indeed the most Glorious Visions are largely spontaneous as is illustrated by our recognizing inventors in a specially tantalizing way, by means of those famous but usually worthless medallions of merit, patents. We publicly herald vision, that appears to be "practical," with the patent medal and then in the next breath we try every means possible to make the medal innocuos, if the man of vision does not get out and show and rout the hosts of Tories from Missouri. In this regard, however, we show much enlightenment. The past has usually persecuted their men of vision, their prophets and philosophers (unless they were very shrewd, shrewd enough to buy all the corn in the land of Egypt if they prophesized famine). In that parable that attempts to account for the gap existing between animal and man, we are led to the gradually rising mountains of the Himalayas and given the vivid picture of highly developed apes living in a tropical forest that was gradually being replaced by grassy plains or sea shores as the elevation increased. Apparently the Mountains gradually cut off large numbers of these apes from their forest jungles and by imposing upon them the entirely new environment of living upon the animals of the plain rather than upon the luscious fruits of the tropics, drove them from their Tory ease to either death or a most radical revolution in their method of living. We can almost attribute vision to whatever leaders there were in this revolution and wonder whether their compatriots granted them patents for new ways of obtaining deer, nuts, oysters and bison. But our Conservative friends will not attribute this marvelous period of progress to Vision but to the Mountains. Even if they are Idealist Progressives they will prefer Blind Will to what we might condescend to name "Blind Vision."

An element of the new philosophy concerns itself with one hundred per cent efficiency. It aims to get at the very bottom of progress. We are not only interested in perpetuating the visions of youth and of the periods that accompany epochs of progress but also in the larger problem as to how our minds got imprisoned in their walls of clay, baked skulls of adobe, and how we shall be able to get them out again and forever after keep them out. Conservatives may indeed gasp at such a radical problem but is this not imperative? All in the air the conservatives will say hotly, but was that not exactly the position that the rising Himalayas left the conservative apes in those early days when the tropical jungles disappeared? Our position is not that of letting the Mountains do it, but to so organize society and especially to so encourage and train our youth that their imagination, vision and hope is not gassed but given all the godspeed possible. Can society not apply eugenics to the conservatives? Why does society not eliminate the conservatives and not wait for the blind forces of the Mountains to do it? Instead of this the Mountains are left to resurrect the poor weak souls of those dreamers that gave their lives that others might live. The moderates will urge that we must go about such a very serious mater sanely. But is that not the damning sickness of the conservatives, too much Superficial Saneness. A sorry condition is that the Mountains do not always transform the apes or lemurs into Men but vice versa. For the Mountains we may insert the Great War and how muddled our simple allegory then becomes. Anyway, you are a Conservative and I meet you face to face, what will I say. Very likely, "beg your pardon," I had not understood or felt your position. Let me become rich, famous and popular and I step down to a lower plane with you with pride and pleasure. But the new philosopher keeps his faith that it is he that can move the Mountains.

How self interest predominates our philosophical actions is illustrated in the problem of life after death. Even the most reverent philosopher and scientist among us will take a glance at a discussion of this subject in a Sunday newspaper supplement but who has even heard of a reverent search made for the life of the soul before life. If dead souls are as little interested in us as we are in the existence of those unborn it is a safe gambol that we shall never hear from those that have gone over. Not only should intelligence be allowed to apply eugenics drastically but it also seems rational to assume that if millions can be spent on the improvement of the cultivated plants and the domestic animals, some account of the selection and the loss of billions of billions of sperms and billions of ova should be a matter of inquiry. Even the days of early childhood are left without much investigation. Who has

looked for the glory and the dream that was so clear to Wordsworth in his "Ode on Intimations of Immortality from Recollections of Early Childhood." And yet, are not we, as well as the race, largely what we are because of what has been; are not many of the essentials of our philosophy the things that slip from our tongues occasionally and from our actions invariably, the methodology of our growth and development, a product of what we might call blind or unremembered vision or instinct? Should not society be starting millions of Darwins, Mendels, Burbanks, Newtons, Faradays Maxwells and Shakespeares for the future generations? Ought we not to know enough about our own origin to guide our own race to an ideal before we wish to secure perfection in plants and animals. Should not the best knowledge of the race determine which of the billions of millions of sperms shall constitute the continued posterity of the race?

Idolators are we to always ask to see.
Did not the Will decree and build the eye that's free
From far astronomy to fine microscopy?
Earth visibility, conventionality.
Unseen Reality is only what does be.
Faith and Hope of Gene, thee that precedes, agree
To call the Things that be, thou form Reality.

## III. (13) SCIENTIFIC FAITH AND HUMILITY

The layman is likely to look upon the laboratory man as a cold calculating machine, a man that scorns all but the exact, a butcher and vivisectionist if his laboratory has to do with physiology. But this verdict applies only to the specialist who has ceased to be a Man. The laboratory worker exercises Faith just as utterly as the Honest Shepherd or Priest. He is the real Physician of Men. Wherever a Man Labors under the Inner Imperative a Lofty Pride and a Deep Humility will commingle in his Heart. The wiser a Man becomes, the more clearly will he perceive his own Weakness. Work, Love Loyalty, Dignity, Honor, Faith, Sympathy, Human Interest, Hope, Confidence, Trust in the Inner Methodology and Humility will more likely be found in the Pure Research Laboratory than in any other shrine in the world else it be a temple of truth that is being subject to persecution, a situation common to all the earlier laboratory workers such as the Prophets, Christ and the Philosophers, and one that is mildly true today. That there are many little men in the laboratories today is of course true but there are probably fewer than in most of the fields of routine work. The conversion of a man to Real Research and Philosophy makes a Man of him, it gives him the Quest and Urge to Learn of Youth, the Zeal of the Prophet, the Fire of the Fanatic, the Optimism of the Inspired, the Caution of the Seer, the Faith of the Saint and the Humility of a Lincoln. All these belong to the same school.

No group of workers requires the Faith that is necessary of the Laboratory Men. (21) IT IS THEIR PURPOSE AND THEIR BOUNDEN DUTY TO UPSET THE EQUILIBRIA THAT LESSER MEN WORSHIP. THE ONLY WAY TO ASCERTAIN ABSOLUTE AND ABIDING VALUES IS TO FLUX PHENOMENA AS MUCH AS POSSIBLE. AN ECONOMIST SHOULD INTENTIONALLY TRY TO REVOLUTIONIZE CURRENCY VALUES IF HE IS TO ESTABLISH TRUE STANDARDS OF VALUE. IN EPOCHAL SOCIAL CHANGES WE GET AN ACCURATE PERSPECTIVE OF DIVINE, MORAL AND EPOCHAL LAWS. THE VERY FLUIDITY OF PHENOMENA IS THE ACID TEST OF WHAT IS WORTH WHILE, INVARIANT AND ABIDING. IT IS THE COWARD AND THE WEAKLING THAT TAKE REFUGE IN THE ANCIENT SUPERFICIAL STANDARDS, LAWS, PRIVILEGES, MONEYS, CASTE

RIGHTS AND EXEMPTIONS. THIS IS A CONDITION OF OLD AGE IN ITS DOTAGE. Debauch the currency and watch the wriggling of the bankers. Bolsheviki the state and see the bourgeois tremble, and dissolve the church to the consternation of the superficial. Religion is just as likely to become encrusted with the scales and the horns of a bony ritual and ossified ceremony as were the ancient Mesozoic Reptiles and Turtles or as Satan with his hoofs and horns. We all know that any condition is a complex of an almost infinite number of equilibria. When one destroys the ecological groups of animals and plants of the forest primeval in any country there results a whole holocaust of change. When Lenine, of the Bolsheviki, tried to flux the economic and social life of Russia he upset an infinity of equilibria that set the whole world to thinking. No doubt one reason why the Hebrews could write a Bible was due to the Fluxing of their moral and ethical values that their Canaanite neighbors inflicted upon them. Historical and Evolutionary Fluxes appear to us to operate blindly and only in this respect do they differ from the laboratory processes. Both generate Faith and Humility if we go through them as men.

The source of Faith and Humility are essentially within. An intense centrifuging action separates the wheat from the chaff and blows the chaff away. But it requires a much more profound philosophy to produce the wheat. Electrification goat riding and burial do not effectively burn the vows of a secret order into the mind and heart. Living among the sarcophigi of the catacombs or the mummies in a museum, a sojourn to a cavern of skulls and bones below a cathedral or even the bread and the wine of the Holy Sacrement do not greatly purify the heart of themselves.

Long before memory has crystallized, the deep imperatives of life had worked with " faith " in the development of a new individual. Every entity of life is filled with " hope," a sense of well being, an euphoria, trust, faith or a bien-étre. Wretches that we may be, bound to beds of infirmity and distress or deranged in mind, we invariably are hopeful for the future. Toxic dysphoria and delirium tremens we consider as due to the environment. Normally we " believe " that every one that wisely endeavors to know phenomena will gradually acquire this knowledge. This faith is justified by the growth of science. Whether you call yourself a mystic or not, you contain the inner courage to live the right life because it is the teleology of your destiny. You " feel " that a life devoted to the good, the beautiful and the true will be progressively integrated into positive satisfaction and justification.

The scientific attitude is sometimes spoken of as the Ideal Attitude of the Observer who eliminates himself from the

phenomena that he is describing and who is assumed for this reason, to approximate Reality the more closely. This Ideal Attitude is such, however, because it aids in eliminating Exterpolation. No automaton can, or is ever designed, to see Visions of the Beautiful, of the Good, or the Truth. No automaton can unravel the Gordion Knots of philosophy and continued progress requires more and still more Genius, Inspiration, Humility and Faith. The first requirement of the Observer in the Laboratory is a Program and this aim is to Stimulate the Absolute Program of Reality by Approximation.

One Source of deep humility to the Researcher is the very small number of people that are interested in his program and the infinitesimal number of workers. In a Democracy, it is discouraging to know that it is only the very few rich philosophical souls that aid research spiritually. There are many specialists. There are hardly any Lovers of Wisdom. Were the average middle man interested in an Abiding Reality, in the invariant elements in this world welter of tragic change and in a Homeland of Permanence and Security as a rescue from our present state of seemingly Hopeless Rise and Fall and Decay and Death, he would forsake the heathenish environmental philosophies that he now holds and fall into line with the Truer Faith. The New Philosophy inspires the Hope of a Consistent World of Pure Thought Founded upon the Ultimate Entities of the Objective and the Subjective Worlds and the innate Relations of these Entities, a divinely ordered array of ideas that is stabalized by the invariant flux of the sensous and subsensous. The Deep Base of all Phenomena is given by our Vision of the Common Entities that remain conserved throughout the endless chain of change that links them together into the Macroscopic World. In the far flung microscopic structures are to be found the Records of the Past and the Immutable Program of the Future. To the Convert of the Faith in the Eventual Operation of the Absolute Imperative of the Soul is given the Revelation that Somewhere, Somehow and Someway a Greater Vision follows any Despair that may seem to overwhelm us.

You may say that it is inexperienced, altruistic and noble Youth that goes down to the Laboratory, full of Faith, a Believer in Laboratory Fair Play; it is youth that consecrates his Work with the Enthusiasm of a First Love. After decades of Labor, you say Youth will find but the Tremendousness of an Environment that so tragically confronts and oppresses him; a Sphinx that sits speechless by the surgings and the heavings of the Flotsam and Jetsam on a High Nile of the marshalled and the unbroken Phalanxes of Microscopic Phenomena. The Laboratory may become a Wilderness in the cold, empty darkness of Night. You may see but the

Errors and the Weaknesses of the Mind and of Humanity; the Faux Pas of the too enthusiastic Spirit of Youth; the Laissez Faire Policies, the Ennui and the Falseness of the Elder Statesmen; the Devil busily engaged in trying to overcome God's Inspiration to man to make here and now a Kingdom of Heaven; and in the Legislative Laboratory, the Temple Laboratory, the University Laboratory, as well as the Pure Science and Philosophy Laboratory you will find Talk, Bigots, Pedants, Snobs, Superficial Worshippers of Research Papers, Self Advertisers, Propagandists and Changers of Money. The youth comes to hear the still small voice of his Muse; he is in search of the Philosopher's Stone of Great Price; he finds a Constant Parade of Ease and Ignorance; he sees the Flurrying to and fro of Exalted Ambition and Bigoted Superficiality, the Political, Social and the Business Castes; he is taught the Sacredness of the Practical worshipped as the Golden Rule of the Golden Calf by those whom Society has permitted to become the Holy Guardians of the Trinkets and Apparatus of Civilization; he sees these Thieves buy Manhattan Islands from the Untutored Laboratory Enthusiasts with wampum and tin cans; he encounters the Eternal Stalking of Naked Space, Time, Death, Evolution, Infinity, Ignorance, the Devil, the Origin of Things, Chance and Causality. Youth is persuaded by the Older Owls to go out into No Man's Land instead of eating, drinking, riding, building, talking and strutting. Youth feels contempt for the puppets and the parrots of the play of Environment of the Fleshpots of Egypt and sallies forth as a Don Quixote Puritan on the bare Rocks of Plymouth or to the Wilderness to live upon Locusts and Wild Honey. He finds the ostracism of home and church and state. He sometimes feels that the Sacred is but the Parable of Propaganda of the Effete Elders. He is pushed out of Wall Street into Trinity Church and the Cemetery. On each side of the Path to the Promised Land are the Red Sea Waves of Oblivion. In the Triumph of Truth the Veteran Worker feels the Shot, the Shell and the Hell of Verdun. The worldly spend the Treasures of the race and live the silliest Tales that are told. Even most of the "Laboratory Directors" are of the world worldly. The Youthful Explorer in the wonderful but dangerous and unknown Lands of the Laboratories may only find himself crucified by the economic, the social, the religious, and the Pharisee and Roman Hedgemony of a Conservative and Selfish Caste System. The research worker sees an unlimited quantity of data, of detail, of phenomena that must be studied, classified, analyzed and synthesized. At times all may seem Chaff. How is Energy Partitioned endlessly between the billions of billions of billions of billions of electrical Parts that constitute the matter all about us? How can

Wisdom be Partitioned among men and women? What gives life working Power to the blades of grass; that permits you to read this page and what is to describe all the actions of man made automatons? How are the Judges, the Pastors and the Physicians to herald the higher civics, morals, ethics and the soul Imperatives of a Divine Providence? How are we to find the Record of the Past and the Future Design amongst all the Infinite Detail of the Laboratory Complex? How can the Infinitesimal Electrical Parts, the electrons, contain a very complex structure of inertia elements and possess velocities ranging from those of our daily world up to those of a hundred and eighty thousand miles per second and be the source of thousands and thousands of light notes? What means the Mighty Flow of the Stream of Life down through the Geological Ages? What more Humiliating Message could be flung at man than that his earth, his sun, nay even his Milky Way of Suns may be but a Speck in the Universe, the Puppet of Invariant Law: that man's own reason is so largely the Parrot speaking as the Self of Environment; that he appears as but one of the Apes in a long line of ancestry whose genealogy goes back beyond the cell: that Evolution fashions his feet of clay and hems him in such an infinitely balanced equilibrium of conditions that one of millions of changes would ignominiously destroy him as certainly as the blasts of winter chill the day fly to its Death; that his own body is a most wonderful complex of automatic interdependent organs operating by the narrowest margin of ordered physical and chemical conditions about which man himself is grossly ignorant; that his own soul spontaneously evolves from the deep mists to be continually tormented by its ignorance, its weakness, its aspirations and its antinomies, to be imprisoned in its skull of clay so that it can communicate with its fellow souls only by means of its Environment Jailor and to be kissed frequently and sacredly by the kiss of the Judas of its fellow souls; that on his Cross and Gethsemane of Despair he sees his Reason tottering on its own Footstool before the Fate of its own Decree, Suicide, and that he knows he will be suddenly and quickly cut down like the grass of the field, knowing not where goeth that Flickering Awareness when the prison walls of the Environment collapse and Eternal Oblivion Ends it all.

Can the Reign of Law, the Uniformity of Nature, the Universality of Cause and Effect, the Impossibility of Understanding the Essence of Relations, the Existence of but an Infinitesimally Known Part of the Great Design heal those Mortal Wounds of the Soul's Humility? Can the Unity of a Natural Atomic Scale and the Simplicity of a Superficial Philosophy remend the Hopes of a Vanquished Enthusiasm?

What Faith is to be the Compass in the New Land? What Power will Save us from the Abandonment of Hope? What Pilot is to Guide us through the Unknown Seas in the Future? What Love is to sooth the Contemptus Mundi of the Soul of a Doubting Thomas?

The answer is the Antinomy that the soul can see its Greatest Vision only in the Humility of its Garden of Gethsemane: that it is to reap its greatest Victory in its Tryst with Death: and that our very being begets the Faith that in all the Evoluions, in spite of the continued Smiting by the Environment through the Ages, our Soul is the Robinson Crusoe in its Little Isle of Somewhere. We have been given to see the stars by night as did the shepherds of old and we have had the Stored Treasures of the Races in their men of Vision and of God. We have seen by the light beams that have come from suns thousands of millions of millions of miles away that those distant worlds are built of the same kind of electrons and positive nuclei as is our own. How can even two electrons happen to be alike much less all the infinite hosts of these electrons throughout the almost infinite universe? What Imperative has impelled the Stream of Life through the geologolical eras? How can such an Infinite Teleology and Unity be only a Subjective Reflection? These are the Experiences that give a Manifestation of a Greater Mind just as Gethsemane gives the soul the Import of a Kinder Heart. That I should know these things gives me great Faith that the Teleology of this little that is seen is but the Earnest of the Riches yet to be. As we have sown Faith and Love and Works so we have reaped Grander Hopes and Tokens that these shall not Unrequited be. Through the Teleology to the Countless Equilibria, the Opposing Antinomies, the Actions and the Reactions, we have always seen, so far as our Laboratories have developed, the Means that would permit the Equilibrium to be shifted. Even Death has often been fought back in its onward flight and we Trust the Power that has endowed our souls with this directive Force over the Equilibria. Our Life's Faith that loomed so large in the Sunrise of youth's zeal should very properly return to us as the colors darken and the mists gather about our prison house at Sunset Time, so that the deeper our Humility, the richer shall be the Vision our Faith shall see. Were our experiences to be felt as an Understood Reality we would be but the Resonating Material Automatons in our Mortal Images of Clay, to Dissolve from Dust to Dust at the Embrace of the Grave. The very Discord of our Souls with their Automatic and partly Controllable Environment may be the Revelation of their Divinity. Our very will determines whether our force field halo shall be positive or negative, electrically, or heaven or hell, eschatologically.

## IV. SOME TENTATIVE PROBLEMS OF THE NEW PHILOSOPHY

(14) **The Problem of Gravitation.** The phenomena of Gravitation and the earth's surface conditions are determining factors in our physiological evolution, the work of our daily lives and the law of the solar systems and the example of one of the simplest and most accurate Laws of Nature that man has discovered. Newtonian Gravitation introduced the idea of a Force acting according to the inverse square of the distance into philosophy and the same idea has been extended into electromagnetism. The theory has introduced and Defined the ideas of Action at a Distance, Length, Time, Inertia, Mass, Force, Work, Energy, Acceleration, Action, Reaction, a Mechanical Straight Line, Collision, Contact, Impulse, Impact, Elastic, Momentum, Moment of Momentum, Centrifugal Action and Conservation of Mass, Momentum and Energy. It is the Philosophy upon which our System of units and laws of nature are based. The application of this system to geodesy astronomy, engineering, mechanics and thermodynamics is so successful that the pragmatist would place it in a niche among the Reals. It has been the practical philosophy upon which our present metrical civilization has been built.

Our philosophy as Laymen is essentially mechanical, the experience of the senses. We are satisfied that we Understand a phenomenon when it can be simulated by a mechanical analogue. The past generation tried to make a mechanical model of the ether and of the human body. Nearly all the attempts to discover perpetual motion is made by mechanical apparatus. Our bodies are built symmetrically about the gravity lines of force. Up, Down, Right, Left, Behind, Beyond, Over and Under are Gravity, Line Directions. North, East. South and West are essentially defined by the Gravity and Light Lines that connect the earth and the sun. The Relativeness and the Dependency of Direction upon the Local Gravity and Light Lines is the extent of our present knowledge. In every day life we build our houses, our automobiles and our steamships about the gravity lines so that unconsciously we are largely molded by the structure of the gravity field as it has evolved us through the ages.

The Einstein Effect of the bending of a ray of light in a powerful gravity field such as that of the sun is the first of the pure ether effects and is of great importance as it relates the

gravity world with the electromagnetic world. But this effect and the experiments upon the effects of gravitational force in the laboratory are essentially macroscopic in that the smallest masses between which the gravitational attraction has been shown to operate have contained billions of billions of billions of electrons and positive nuclei. We do not know whether these molecular, atomic and electrical parts are subject to the law or not. We do not know the effect of temperature upon the atraction. We have never discovered any Relation between Gravitational Attraction and Time. So far as we know it is a Pure Invariant as Regards Time. It is only Variant in Space. Some scientists have suggested that it acts Instantaneously. Others have pictured it (Le Sage) as currents of Ether Atoms with the velocity of light or as longitudinal ether waves with a velocity many times greater than that of light. If the latter condition holds, gravitational action would possess great theoretical value in a Relativity Theory as a Signalling Means. The Nature of Gravitational Attraction is unique in its apparently Perfect Penetrating Power. It appears to penetrate matter just as easily as light penetrates the ether. The Einsein effect is the only known one of the many possible relations with the electromagnetic world. (Majorana [Comptes Rendus, Nos. 15, 17, 1919] claims that a mercury screen partially absorbs the earth's force of gravity acting upon a lead sphere).

Philosophically the success of the theory of Gravitation is largely due to the simple conditions that result by its assumption. On the earth we can omit all consideration of the gravity field of the stone and consider only the almost straight lines of the gravity field of the earth. The philosophy of electromagnetism is so much more difficult because it is essentially a space problem rather than a line problem. When astronomical Gravitation is considered the Problem is much greater. The problem of even three bodies, such as the sun, the earth and the moon, involves differential equations depending upon the time and the nine coordinates of the three bodies. These equations are very difficult to integrate. Lagrange, Hamilton and Jacobi developed the principle that any function that is a maximum or a minimum for a given set of variables should remain so for other sets of variables. The differential equations of three bodies are then considered as stated for a maximum and a minimum problem and that these persist whatever variables are employed. (Birkhoff [Science, Jan. 16 1920] supports the view that the earth and the moon are receding from the sun).

This world of the centimeter gram second systems has been viewed as physical, objective and dead, subject to invariant law and filled with ultimately invariant entities universally

interrelated by a flux of energy subject to a general entropy law of which thermodynamic entropy is a special phase.

(15) **The Problem of Life and the Soul.** The view that living beings and our consciousness arises spontaneously or is a function of some world order as is the sunset or the crystal does not usually consider that all these unities are summations of invariant atomic unities. The red of the sunset is the red of the atoms of the sun. The immortality of the painting that is burned is to be found in the imperative of the soul that painted it. Our evanescent bodies are the products of the operation of the vital imperatives that dwell within. The apparent dissolution of the unities such as the sunset does not imperil the existence of the sun, the burning of a painting does not destroy the painter and the death of our bodies does not harm the soul. The automaton glorifies only its soul creator.

Our confusion in life is largely due to our ignorance of the structures that precede the visible and especially the mechanical unities. The painting, the printing press and the pyramids of Mexico are viewed as isolated unities whereas the basic reason of their being is the soul of the painter, the inventor and the architect of an ancient Mexican race. (22) OUR WISDOM AND OUR LANGUAGE IS IN CHAOS AND IS MYTHOLOGICAL BECAUSE THEY DISTRIBUTE EMPHASIS AND VALUE IRREVERENTLY. THE COMMANDMENTS, THE LAWS, THE RULES, THE DECALOGUES, THE PROVERBS, THE PARABLES THE AXIOMS, THE POSTULATES AND THE ROOTS OF THE NEW WISDOM AND THE NEW LANGUAGE ARE TO REST UPON THE INVARIANT STRUCTURE OF PHENOMENA. We will obtain a true perspective of life and the soul when and only when knowledge is built upon the ultimate entities related by natural laws in a way that is indicated by our present crude system of centimeter gram second units. This philosophy is an absolute idealism compared with the chapter that is represented by the field covered by our individual consciousness. Materialistic evolution itself is but a glimpse of the flux of equilibria of the ages. (23) PHILOSOPHY IS TO SPEAK THE LANGUAGE OF THE EVOLUTION OF THE ATOMS THAT REQUIRES BILLIONS OF YEARS: IT IS TO LECTURE US ON THE THE PROGRAMS OF THE BILLIONS AND BILLIONS OF GENES AND CELLS THAT HAVE BEEN DEVELOPING SOCIAL, MORAL AND ETHICAL SYSTEMS FOR TENS OF MILLIONS OF YEARS. IT IS TO DESCRIBE THE BILLIONS OF BILLIONS OF BILLIONS OF EQUILIBRIA THAT CONFRONT US AT EVERY STEP IN PROTOPLASMIC CHANGE, IN CONSCIOUS PHE-

NOMENA, IN THE ELECTROMAGNETIC WORLD AND IN THE FLUX OF ENERGY. Philosophy may be a monotheism, it may be a monoatomism in my capital I, I. I. It is also infinitely more. After billions of apples have struck the heads of billions of Newtons, philosophy will be developing. What could be more inspiring for future ages than the grandeur of these new worlds to conquer? There is no occasion for the ennui of an Alexander.

Were it not for the invisibility of the souls, were it not for the tremendousness of the objective world and the imperfection and the transitoriness of the reign of the soul over the material world it would be just as logical to picture the spontaneous origin of the electromagnetic world out of the soul world as it is to suppose that the primeval amoeba or the celestial germ evolved spontaneously out of electrons and positive nuclei just as have the matter atoms, the molecules and the crystals. It may be that the ponderable world will the more easily be shown to be a product of the soul imperatives than the reverse. This is the trend of modern philosophy. The laboratory proof of life after death will be a firm support of a stable idealism. How disappointing it is that the religious organizations do not thoroughly support sane research effort along these lines? Above all, idealists should be researchers. The problem of one, two and three bodies has been quite accurately solved for Newtonian Particles such as planets and suns but the similar problem for the subjective entities has not even been stated. Real Relativity Theory will be born when we can state the problem of one subjective and one objective entity. (24) AS THE MISSING LINKS OF EVOLUTION LIE IN THE HISTORIC PAST AND THE MICROSCOPIC WORLD SO THE RELATIONS OF THE OBJECTIVE AND THE SUBJECTIVE ARE TO BE FOUND IN THE SUBCONSCIOUS AND THE MICROSCOPIC WORLD. AS THE ELECTRIC FIELDS ENCYST AND ARE CONCEALED IN THE MATTER ATOMS AND MOLECULES SO THE SOUL IMPERATIVES ARE BURIED IN THE GENES, THE CHROMOSOMES, THE CELLS AND THE BODIES OF PLANTS AND ANIMALS. THE SUBJECTIVE WORLD MAY BUT BE THE PARTITIONING OF ENERGY AMONG THESE HIDDEN IMPERATIVE CONTAINERS. A real belief in the immortality of the soul must describe its past as well as its future. A real program of research is as much interested in the life before birth as in life after death. (25) REALITY, THE DESCRIPTION OF THE OBJECTIVE WORLD IN TERMS OF THE SUBJECTIVE WORLD AND VICE VERSA ARE CONDITIONS OF INTERCOMMUNION BETWEEN THESE

WORLDS FOR MILLIONS OF YEARS IN THE PAST IF NOT FOR ALL TIME. HARMONY, RESONANCE AND THE A PRIORI CONTENT OF AN IMMORTAL SOUL ARE NECESSARILY PROBLEMS THAT ARE CONCERNED WITH AS MUCH OF IMMORTALITY THAT THE LABORATORY CAN CIRCUMSCRIBE. Pangenes, chromosomes, cell nuclei and physical bodies are but sign boards along the way.

(26) IT HAS BEEN ASSERTED THAT THE SOUL WITHOUT ITS OBJECTIVE CONTENT WOULD BE ALTOGETHER EMPTY. THE GENERAL THEORY OF RELATIVITY FOR US, AND HERE WE ARE PRONE TO ASSUME THIS CONDITION GENERAL, CONCERNS THE ATOMIC RELATIONS OF THE SOUL AND THE OBJECTIVE WORLD. Before philosophy becomes basic these resolutions must be put into the form of postulates. To say that the relations do not appear in consciousness and that they are therefore nonexistent neglects the condition that the consciousness recorded by memory is macroscopic and is related to but a part of the development of our bodies. The Einstein theory of relativity assumes that absolute motion and acceleration is not subject to the cognition of the observer soul and that therefore we will never be able to determine them. The whole realm of any self centerd system is therefore assumed to be capable of being moved and accelerated without being self conscious of any change. When we remember that in the physical world all phenomena are those relating to energy changes it follows that the self contained entities can know of nothing in and by themselves. Death and the end of the subjective would follow as soon as the objective flux to the soul is cut off. The approximate accuracy of this theory is indicated by the theory as it is applied to physical science.

No theory of relativity can attain to complete generality either in the macroscopic or in the microscopic world. If we assume that essentially the whole universe is visible then absolute motion and acceleration can be approximately ascertained. If we assume that the past history of the flux of a system can be obtained then we have a means for essentially describing absolute motion. If we assume that energy is not continuous but atomic and subject to cognition then absolute motion and acceleration are objects of metric description. When the rotatory motion of a body such as the earth is concerned we feel satisfied that its absolute angular velocity could be measured upon the body itself. As the forms of motion are intimately related in the flux and the partitioning of energy it should follow that absolute motion and acceleration should

be capable of expression for each entity. (27) THE ABSOLUTE AND IMMORTAL CHARACTERISTIC OF THE SOUL IS DUE TO ITS BEING MORE MICROSCOPICALLY STRUCTURED THAN THE OBJECTIVE WORLD. THE SUBJECTIVE ENTITIES ARE OR INCLUDE THE ULTIMATE ENTITIES. There is a trend towards assuming that souls are much alike after all. Differences are attributed to heredity and to different environments experienced during growth. Insanity is often shown to be physiological. Christianity and Democracy assume the ultimate equality of value of the individual. If biology is to assume that all life came from the same cell it follows that all differences between the souls is to be attributed to environment. The trend of atomic physics is to consider all the negative electrons and the positive nuclei to be identical. The content of the soul after death must necessarily be very different from its conscious content during life. Its life experiences may die out as dreams so that the frivilous messages that we are supposed to receive from the dead are to be expected. Until man has discovered a more microscopic language it would appear useless to exert effort to communicate with the dead as is now done. (28) THE A PRIORI CONTENT OF THE SOUL AS IT COMES UP THROUGH THE CELL STATE OF EXISTENCE SHOULD NOT BE EXPECTED TO BE CONTAINED IN OUR ARTIFICIAL AND MACROSCOPIC LANGUAGE BUT IS TO BE FOUND IN THE METHODOLOGY THAT IT APPLIED IN ITS GROWTH AND DEVELOPMENT. THE ESSENTIAL NATURE OF THE SOUL IS TO BE FOUND IN INVENTION, DISCOVERY, PROGRESS. INSPIRATION, IN THE DIRECTION OF BODILY GROWTH AND IN ALL THAT IS BEYOND THE AUTOMATIC AND THE ENVIRONMENT. IMMORTALITY IS A MATTER OF METHODOLOGY AND NOT OF KNOWLEDGE KNOWLEDGE IS BUT THE MEANS. KNOWLEDGE BECOMES BUT A DREAM IN SLEEP AND IN DEATH. YET IN SLEEP THE CONSTRUCTIVE POWERS OF LIFE ARE ESPECIALLY ACTIVE. AS THE STRUCTURE, IF ANY, OF THE ELECTRON CANNOT BE MORE THAN PARTLY ELECTRICAL, SO IF THE SOUL IS "ELECTROMAGNETIC" AND POSSESSES STRUCTURE THESE PARTS CAN ONLY BE PARTLY ELECTROMAGNETIC. THE SOUL MAY THEREFORE BE PARTLY "OBJECTIVE" AND PARTLY SUBJECTIVE.

Wisdom and education should therefore be primarily concerned with the powers of the mind. Civilization is to be planned so that routine shall be reduced to a minimum. (29)

THE ESSENTIAL GOAL OF THE SOUL IS ONLY TO BE OBTAINED BY ITS INSPIRATION, ITS REVELATIONS, ITS ORIGINALITY, ITS DISCOVERIES, ITS RESEARCH EFFORTS, ITS INVENTIONS, ITS POWERS AND ITS METHODOLOGY. HEREIN LIE THE FIELDS OF THE SOUL'S ENDEAVOR. ONLY IN THIS WAY CAN THE SOUL PREPARE FOR IMMORTALITY

A certain amount of the flux of the macroscopic world appears to be good and even necessary for our present state. But one should not permit the mechanical and the visible world to take a very important place in the development of the culture and the wisdom of his inner sanctuary. When Hume spoke of death converting the soul into a void he referred to a void of the Gross World only. When Osler mentioned chloroforming men above sixty his intimation could only apply to the ossified serf specialist. Men entropyized to Freedom and the perfection of the methodolgies of their souls never petrify. The "origin" and the "goal" of conscious effort appears to be in the subconscious. As the spectrum colors only represent a very small portion of the range of frequencies that appear to sink and flow from the negative elecrons and the positive nuclei so consciousness appears as but a very minute portion of the experience of the soul.

(16) **The Problems of the Understanding.** To many specialists and laymen, terms such as the understanding, reason and judgment carry an Exaltation and an Exterpolation that is altogether unwarranted. Because these myths are a matter of every day speech they are as real to us as the view of the Greeks that Atlas stood under the earth and supported it upon his shoulders. In some manner we launch out into the realm of the macroscopic world just as the mathematicians start with certain processes and axioms that define legitimate operations and from these is built a consistent system. Memory and history are both largely a matter of language and writing. It is said that we get no more out of mathematics than we put into it. In a restricted sense the same may be said as to our understanding. Consciousness begins, say some idealists, with a first recognized sensation or percept in the soul. This image from the objective world came through the bodily medium which we may temporarily call a nerve. To this day we appear to know nothing of the external world except through the language of the nerves so that qualitatively we feel only what the nerves convey to us. (30) THE NERVES AND BODY PARTS ARE THE PRODUCTS OF THE SOUL METHODS JUST AS MUCH AS ARE THE SYSTEMS OF MATHEMATICS. The wearing out of an automaton has no relation to the Immortality of its Builder. The

term soul in this case requires a different definition than that of an Awareness and Memory.

The term "understanding" as used in science means that when Franklin shows that the same electricity can be drawn from a cloud as is obtained by rubbing glass with silk, we say we explain or understand lightning. We relate electric sparks and lightning strokes. We understand the chemical nature of water when we electrolyze it into oxygen and hydrogen. (31) BY THE VERY NATURE OF UNDERSTANDING AS WE USE THE EXPRESSION, WE MUST REST OUR EXPLANATIONS UPON SOME UNEXPLAINABLE ENTITIES OR SUBSTANCES OR WHATEVER WE DECIDE TO CALL THEM. THESE UNEXPLAINABLE TERMS CANNOT BE "NOTHING" AS WE ORDINARILY DEFINE THIS TERM. We thus arrive at the ultimate. (32) THERE HAVE BEEN TWO WAYS AT ARRIVING AT THE ULTIMATE. WE CAN START WITH THE GENERALIZED UNITY AND GO DOWN TO THE MICROSCOPIC WORLD OF DETAILS OR WE CAN START WITH THE ATOMS OF THE MICROSCOPIC WORLD AND SYNTHESIZE THESE INTO THE MACROSCOPIC UNITIES.

In geometry we can start with the cube and derive planes, lines and points or we can start with points. (33) THE LABORATORY METHOD EMPHASIZES THE ATOMIC. Principles are of great value and are used in the laboratory method but wherever it is possible the atomic method is adopted to explain and classify phenomena. The meaning of the term understanding is therefore a matter of the atomic method rather than of principle though of course both uses are proper. With all its triumphs modern science has not discovered any new power or process of the soul. Socrates and Plato used the same mental laboratory methods that the modern chemist or astronomer employs. (34) UNDERSTANDING IS A POWER OR A PROCESS BY MEANS OF WHICH WE ANTICIPATE EXPERIENCE. The specialist of today simply has more experience than those of six thousand years ago. The aim of the new philosophy is to isolate the ultimate entities of the objectice and the subjective worlds.

The functioning of the understanding can be considered as an a Priori inheritance of the "underworld," a ceremony of the pre-conscious and pre-memory epoch, perhaps even a relic of the days of sperm life handed down by heredity. Recognition, the power to identify and differentiate; the realization of quantity, unity, plurality and totality; the sense of quality, reality, negation, and limitation; the ability to classify relations (as in time and space), inherence and substance, causality and

dependence and community; and the consideration of modality, possibility, impossibility, existence, non-existence. necessity and contingency (the Categories of Kant) illustrate powers, many, if not all of which, are held by all the life entropy entities that build and manipulate the equilibria of the objective world.

17. **The Problem of the Antinomies, the Equilibria, the Indefinables and the Identities.** Macroscopic unities are largely the results of exterpolation, a peculiar point of view and the elimination of an enormous amount of microscopic detail. To a telescopic observer on the moon the sunsets would hardly exist and yet to the earthly human they are important unities. (35) ONE GREAT VALUE OF THE ATOMIC PHILISOPHY IS THAT OF AFFORDING MANY NEW VIEW POINTS AND OF MORE CLEARLY STATING THE EXTENT OF EXTERPOLATION AND ELIMINATION OF DETAIL. The sun is not only what we see but it also includes its halo of radiation that goes out into the vast regions of all visible space. That atomism should lead to antinomies is not unexpected because this is the common lot of all philosophies that do not ride rough shod over the minutiae of experience. When we recognize the mythological character that materialism has enshrined about Contacts, Collisions, Actions, Reactions, Attractions, Repulsions, Motion, Energy, Cause, Effect, Force, Action at a Distance, Power, Instinct, Heredity and Design we will not expect too much of the Ether, Electromagetism, Continuity Atomism, Fields of Force, Equilibria, Invariancy, Sources, Radiations, Quanta of Energy, Electrons and Souls. Each age has its Hierarchy of Sacred Words or Symbols that it worships. These experience the flux due to changing fashions. In the crude precultured times ceremonial priests entrenched this worship by adding a piece of sculpture and the cooking of food in a temple surrounded by fasted men but we moderns are so refined and so wisely educated that all that is necessary of the High Priests of Specialism and Wisdom is that of Coining new words and Hurling them at us. We go the ancients one better by swallowing bait, hook and sinker as we are flooded by the press and propaganda. Here we have an exhibition of an unadulterated and pure but misguided faith.

It is the laboratory that has ever stood by the prophet in his fight against mythology and superstition. (36) IT HAS BEEN THE A PRIORI AND INSTINCTIVE NATURE OF THE SOUL TO EXERT AN INCESSANT URGE FOR SIMPLICITY, A TOKEN OF ITS COMMUNION WITH REALITY THROUGH THE EONS, A SIMPLICITY THAT IS EMBLEMIZED BY THE JEHOVAH OF THE

JEWS AS WELL AS BY THE LOVE OF WISDOM BY THE GREEKS. This imperative leads us to the existence of ultimate and identical entities. This carries us to parts that are interchangeable and invariant as the Electron. (37) ENTITIES THAT ARE INDEPENDENT OF THEIR PAST HISTORY ARE INVARIANT AND ULTIMATE. ELECTRONS AND QUANTA OF ENERGY PROMISE TO FULFILL THIS REQUIREMENT. INDIVIDUALITY IS MACROSCOPIC. If we assume that the goal of every soul is the same and that the origin of the souls was a single source we are led to assume that all the imperfections of the souls is to be attributed to the environment. The aim of the soul is then to so modify its environment that it becomes perfectly harmonious. Atomism leads to the same view of the equality of human souls that forms the bedrock of Christianity and the modern theoretical Democracy.

The contradictions and the realities of atomism are much the same whatever the field to which applied. How can we avoid the doublet nature of atomism? Must we always postulate an Adam and an Eve? a negative and a positive electron? a quantum of energy east interfering with an identical quantum of energy west? a sperm vastly different from an ovum? a North Pole and a South Pole? These entities cannot be composed of smaller entities that are images of the larger ones. This is a common antinomy in all atomic philosophy. A society of all men is not perpetuating. There must be a doublet before a relation is established and this forms a trinity. No subjective process can carry us beyond a trinity. If a negative electron is composed of smaller parts of negative electricity we are confronted with the antinomy that these parts will all fly apart, due to their mutual repulsion, and thus require the condition of an Equilibrium in which some Positive Entity is assumed to hold the negative parts together. Antinomies like this are clearly exterpolations beyond experience. (38) THE PRINCIPLE OF IDENTITY OF ULTIMATE LIKE ENTITIES, SUCH AS THE NEGATIVE ELECTRON, IS A CONDITION OF CONSISTENCY WITH ALL EXPERIENCE AND DOES NOT IMPLY THE ARTIFICIAL PROOF OF IDENTITY BY COMPARISON AS IS EMPLOYED BY GEOMETRY IN THE ARTIFICIAL SUPERPOSITION OF GEOMETRICAL FIGURES. The weakness of mathematics follows from the appearance of Equilibria Like Oppositions in the region of the ultimate entities. The very idea of the comparison of the forms of two negative electrons by the geometrical method is grotesque and the same criticism applies to the comparison of frequencies and energy quanta. (39) THE VERY IDEA OF DIRECTION CONTAINS THE ELE-

MENT OF OPPOSITION SIMILAR TO THAT OF POSITIVE AND NEGATIVE. THE ULTIMATE DEFINITION OF IDENTITY MUST BE VERIFIED IN THE MANNER THAT THE SECOND LAY OF THERMODYNAMICS IS PROVEN. THE MENTAL PROCESSES OF IDENTITY AND DIFFERENCE ARE ESSENTIALLY THOSE OF GENERAL ENTROPY. In this way are we to Define the Indefinable and to Know the Unknowable. If we are to follow atomism to its conclusion and to view the flux that comes to and fro from the soul, as Disconnected from the soul when it is Without it (if the soul is a discrete entity), then all knowable structure must form a part of the soul itself. The success of the soul in applying its processes to the objective world is assumed to be due to the same processes being innate within the soul itself. (40) FROM THE POINT OF VIEW OF EQUILIBRIA IT IS NECESSARY TO ASSUME THAT THERE ARE AT LEAST TWO TYPES OF ENTITY STRUCTURES REQUIRED TO MAINTAIN THE EQUILIBRIUM AND THE EXTERNAL FLUX THAT PERMITS OF ITS RECOGNITION. If the external flux is a part of the equilibrium then the condition is unstable and exhibits evolution or entropy. In this case the ultimate entities must be fine grained compared with the equilibrium entity itself. Disintegration would destroy the equilibrium which would not therefore be ultimate. The idea of ultimate equilibria requires the postulation of Three Ultimate Entity Elements. Let us assume that there are the two varieties of ultimate entities, the invariant negative (E) and positive (P) electrons. For these to be recognized energy (R) must be absorbed or emitted. If E and P are assumed to contain a structure of polarized energy quanta then E and P are not invariant and R itself must contain two types of entities. The soul entity is the third that observes the polarized energy structures of E and P.

Is there but one trinity or are there several? If there is one it must be either subjective or objective. How can I be conscious of my soul if it does not contain parts? But if the soul contains parts how is it to know of a part that is not itself? Evidently we are forced to an idealism that no matter where the ultimate entities may be posited the awareness I is a part of the trinity. The soul may then be considered the Ultimate Nucleus. Irreverently we might identify it with the nucleus of the hydrogen atom and make the negative electron the Unknowable Container of energy flux in the subjective as well as in the objectice world or we may consider the soul as much more microscopic than even the nucleus of the hydrogen atom. Obviously our painting is generously and figuratively criticized. " Microscopically"

becomes a part of a mythological rite. Is the Trinity the dream mirage on the desert of the ultimate? Is the constancy of human nature to be attributed to its limitations? Are we ever to be circumscribed by mythical lands? Must all knowledge be bounded by antinomies?

Trinity, One in Three;
God, and the I that "Be";
The Units x, y, z;
The I, Matter and Thee;
I, not I, Energy;
Mass, Time and Space so free;
Conventionality;
Our Atlas Base doth be.
World Point-Events first bloom
In birth's womb, gloom and loom.
And then we weave the room
Space Time, our Matter tomb.

All Distance Intervals agree,
Where'er Observers World Lines be,
The "measure" of t, x, y, z,
Tells all that "space," and "time" can be,
Makes "forces" artificially,
All science mere geometry.

Here "rests" World Science then you say?
In Relativity's grand sway
Of Point Events in Line Array?
The History of every Day?
But "rods" and "clocks" were far away
When minds were fashioned out of Clay.

## V. THE UNIQUENESS OF THE NEW PHILOSOPHY AND PREDETERMINATION.

(18) **The Unique Atomic Philosophy.** The character of the new philosophy is symbolized in the present trend of manufacture. The older method operated through the skill of the individual who became a specialist. Production was very limited and was frequently monopolized through secret knowledge or the great skill required in the processes of production. The pyramid builders, the Swiss watch makers and the manufacture of many of the munitions of war are examples. The more modern methods are illustrated in quantity production (as that of the Ford motor cars), short hours of labor and the opportunity of the workers to employ their time for their own uplift.

The atomic philosophy finds that the natural entities are built on the principle of quantity production where there are a comparatively few, simple, ultimate, standardized and interchangeable parts out of which all the macroscopic structures are built. The philosophy is the laboratory program for isolating, describing and manipulating these entities. The results are briefly indicated in the natural atomic scale. Assuming that a scale has been worked out with a considerable degree of accuracy in any laboratory the question arises whether natural phenomena could change and the observer be unable to detect the change. Is our knowledge relative? Could the scale be magnified, shrunk together, interchanged, "energized" or "electrified" and our science and philosophy remain invariant? Does the earth have an absolute velocity through space? Is an atom but the solar system in miniature? Is the Galactic Way but a magnified gas cloud? Do germs and electrons love and hate? Can our co-ordinate axes be twisted, transported, rotated and accelerated and the results be unknown or but imperfectly understood by us? (41) THE ATOMIC PHILOSOPHY ASSERTS THAT OUR KNOWLEDGE IS ABSOLUTE. THE ATOMIC SCALE IS ABSOLUTELY ARRANGED. ITS LIMITS ARE UNKNOWN BUT ITS MIDDLE IS ABSOLUTELY KNOWN. No solar system is the enlarged copy of an atom. All flux is capable of observation and measurement by intelligence Any theory of relativity is but a temporary mythology that results from our ignorance. This uniqueness of the atomic philosophy may be temporarily lost in the macroscopic world

but never in the miscroscopic world. This is true in physics where the unit l of length can be multiplied by x to xl: the unit of time t by x to xt: the unit of mass m by x to xm: the unit of electrical charge e left unchanged: and the unit of temperature T divided by x to T/x. A transformation of this kind may leave the form of many of the laws of physics unchanged but the reason for this is that these laws are not expressed in terms of the natural entities and the natural operations. The natural entities appear as uniquely defined. Whether they have been eternally invariant (assuming Time to have a "divine" meaning), or whether they have resulted from an infinite amount of sorting, evolution and standardization for an almost infinite time, will long remain one of the great philosophical problems. But the Faith of the Laboratory points to the Microscopic world as ultimately absolute. Relativity is a Macroscopic condition resulting from the loss of Microscopic data.

The antinomy of flux and invariancy in the ultimate entities remains unsolved but the evidence all favors increased invariancy as the entities become more microscopic. No present law of physics is considered more fundamental than the law of the conservation of flux or energy. With Plato we may continue to say "that if all things undergo change and nothing is constant, then all recognition is impossible: for recognition presupposes a constant object and a constant subject: if everything is in a fluid state there can neither be a subject to recognize nor an object to be recognized." The common course of philosophy is to seek a compromise. The atomic philosophy assumes Invariancies to certain degrees of approximation. The Uranium atom is invariant to the extent that its life is reckoned in billions of years. Our own physical life is "somewhat" invariant for some three score years and ten. The germ life is invariant compared to the flux of toxic change in which it lives. Nevertheless there continues with us the antinomy Motion and Rest: Change and Constancy: Evolution and Stagnation: Growth and Being: Flux and Invariancy: Energy and the Ether: Radiation and Electrons: Force and Inertia; Force Fields and Electric or Magnetic Poles: the Equilibrium Oscillations and their Unknown Containers: the Streams of Radiation and the Vacuum: Kinetic- and Potential energy; consciousness and its abode; the entropy imperative and the soul; the physiological body and life. This common condition of antimony may tempt us to attribute it to a universal lack of power of the understanding as well as an actual "state of reality." The scientific method attempts to solve the antinomy in the laboratory.

The ultimate scheme of phenomena presents a picture of Abodes of the variant flux that permits of their cognizance

in the mental world. There is a seat, a center, a source or a sink of flux, there is the mind container for sensations and memories, there is the nucleus of the atoms and there are the electrons with their electric charge acting as the center of the electrical forces. (42) THE TREND OF ATOMIC PHILOSOPHY IS TO CONDENSE ALL THE ABODES INTO AS "SMALL" CENTERS AS POSSIBLE AND TO DISTRIBUTE THESE CENTERS THROUGH THE UNIVERSE IN NUMBERS THAT ARE PROPORTIONATELY AS INFINITE AS THE SIZE OR FINENESS OF THE ENTITY CENTERS IS INFINITESIMAL. PRAGMATICALLY THIS METHOD HAS GREAT VALUE IN THE LABORATORY. IN THE POTENTIAL FORM THESE ABODES ARE IN STATES OF EQUILIBRIUM AND TO BE "KNOWN" IN THE LABORATORY ONE OF THE ENTITIES OF THE EQUILIBRIUM MUST BE "VISIBLE" OR BE THE ORIGIN OF A CHAIN OF FLUX THAT WILL EVENTUALLY BE AMPLIFIED SO THAT THE SENSES WILL BE COGNIZANT OF IT. THE STRUCTURE OF THE CENTER IS TO ACCOUNT FOR THE ENERGY FREQUENCIES IT RELATES. The kinetic form of energy is closely related to visibility. It is the existence of the equilibria (or vice versa) that causes us to assume the frequent existence of potential energy. The Frequencies are intimately related to the theory of equilibria. (43) INVARIANCY IS INVISIBILITY OF A CERTAIN DEGREE OR OF A CERTAIN ORDER. MATERIALITY IS VISIBILITY. The language of the senses is evidently very much restricted.

The trend of all macroscopic philosophies is to spread the flux of phenomena into a uniform structure such as the Nirvana of the Hindoo or the ether of the thorough going relativist. Even the macroscopic view of the goal of entropy and evolution has been considered to be Uniformity and Stagnation, the Death of Flux. (44) THE ATOMIC PHILOSOPHY, IN ITS SPATIAL APPLICATION, INFINITELY CONCENTRATES STRUCTURE INTO INFINITESIMAL ENTITIES. THE SAME APPLICATION TO EVOLUTION AND ENERGY FLUX ABSORPTION AND EMISSION IN TIME RESULTS IN A SIMILAR CONDENSATION OF THESE PROCESSES INTO HOLOCAUSTS AND CATACLYSMS. THESE ARE THE "SPONTANEOUS" ORIGINS. We have illustrations of this in radioactivity and the reference of evolutionary life changes to the genes. (45) THE SOUL MUST BE THE MOST CONCENTRATED OF ALL THE ENTITIES THE IMPERATIVES OF THE SOUL MAY BE THE MOST CONDENSED OF ALL THE FLUX PHE-

NOMENA. THE LIMITS OF PHENOMENA AND THE UNITS OF METRIC KNOWLEDGE SHOULD BE PROVIDED BY THE STRUCTURE OF THE SOUL. THE SOUL MUST BE ETERNAL AND ETHEREAL AS WE USUALLY EMPLOY THESE TERMS. IF THE SOUL IS TO KNOW ALL THE OBJECTIVE WORLD IT IS REASONABLE TO SUPPOSE THAT IT MUST BE IN REASONANCE WITH ALL THE MICROSCOPIC STRUCTURES OF THIS WORLD. PERMANENCY IN INVISIBILITY. If we are idealists, as we must be if we accept the faith of science that all phenomena are knowable, we are led to assume that the content of the soul is all conclusive. If we assert that there are Things that we cannot know then we are realists and make this unknown realm an absolutely severed realm from that of the soul. All macroscopists are such realists in that they throw away certain knowledge. Present relativity theory is realistic in that it assumes that we cannot know the structure and the absolute quantity of energy quanta. The very imperative of science and of youth to know all is idealistic. It is true that the atomic philosophy is disconcerting in that it does not lead us at present to any definite goal but in this respect all other philosophies are much more inferior. The comparative stability of the material world is a powerful reason for the much greater stability of the world of the soul and its imperatives. It seems a contradiction to impress nearly all the structure of the universe into stellar nuclei and nebulae; to make the sun the center of radiation and force in the solar system (the "outer" members of the system are more powerful than the intermediate entities); the genes the carriers of heredity and the entropy imperatives; the electrical parts the basis of the whole material world and the soul to be the center of all. Yet this is science.

(19) **Macroscopic and Microscopic Coordinates.** Celestial mechanics and the kinetic theory of gases illustrate the employment of coordinates in either a macroscopic or a microscopic sense. The orbits of the planets can be described with a most remarkable fidelity on the assumption that these planets possess invariant masses concentrated into points that are positioned in space at any instant in terms of three co-ordinates x, y, z and a vector velocity v. The co-ordinates represent visible structure while the invisible part in the description is the force of gravitation. In the kinetic theory of gases each molecule or atom is considered as a more or less elastic sphere with co-ordinates x, y, z and velocity components u, v, w. N molecules will require three N position co-ordinates and three N velocity co-ordinates along the selected axes. Assuming no partitioning of the kinetic energy of the

molecules to the ether and collisions that can be described by a coefficient of elasticity the whole past and future conditions of the gas become a problem in mathematics. (46) THE NEW PHILISOPHY HOLDS THE FAITH THAT ANY ATOMIC COMPLEX IS UNIQUELY PREDESTINED BY CERTAIN MICROSCOPIC "COORDIATES."

It is now impossible to treat such a complex system as that of four bodies in the macroscopic sense that is adopted in celestial mechanics. (47) NEVERTHELESS IT IS THE A PRIORI POWER OF THE SOUL TO BELIEVE THAT ITS INTELLIGENCE CAN DEVISE AN APPROXIMATE SOLUTION FOR ALL ITS EXPERIENCES. THE PROCESSES THAT THE SOUL EMPLOYS TO DO THAT ARE GIVEN BY THE ENTROPY PROGRAM. FOR THIS PROGRAM THE SOUL MUST CONTAIN THE BASIC ENTITIES OF PHENOMENA. It is to be noted that it is impossible for one observer to determine more than one co-ordinate at a time and that the solution of the problem would have to be made in the form of Retarded time Co-ordinates. If many observers are to be employed then it is necessary to co-ordinate the data of these individual observers. If more macroscopic co-ordinates are to be taken it is necessary to compare these partial solutions of the problem to the ideal solution so as to fully realize the exterpolations that have been introduced. One of these methods treats the motions of very large numbers of molecules as chaotic just as the drawings in a lottery. 48) THE PHILOSOPHIES OF CHANCE AND ALL LAWS DERIVED BY THIS METHOD ARE MACROSCOPIC AND HAVE LOST AN ALMOST INFINITE AMOUNT OF THE PAST HISTORY OF THE PHENOMENA. The experimental laws of gases as measured in terms of pressures (p), temperatures (t), and volumes (v) are macroscopic. It is one of the prophecies of the simplicity and the unity of the microscopic world to find a term such as the gas constant (R) invariant for all gases. The p, v, t data can be determined from the more microscopic data but the reverse is not true. It is remarkable that we can lose such an almost infinite amount of microscopic data and yet retain laws that are of such wide and valuable application and that contain such universal constants as R. (49) MACROSCOPIC LAWS AND RELATIONS CAN ALWAYS BE THEORETICALLY DETERMINED FROM MICROSCOPIC DATA. MICROSCOPIC LAWS AND RELATIONS CAN ONLY BE OBTAINED DIRECTLY FROM THE ENTITIES CONCERNED. The existence of universal constants is a prophecy of universal entity structures. The condition of obtaining data involves laboratory apparatus that can deal directly with the entities concerned and as the

laboratory is but the automaton of the observer, we are led to assume that the process involves a direct relation between the observer and the given entities. (50) A MICROSCOPIC INTERPRETATION OF PHENOMENA REQUIRES AN IDENTIFICATION OF THE STRUCTURES WITH THOSE "WITHIN" THE OBSERVER.

The conditions of complete predestination and conservation are closely if not absolutely connected. The condition of flux becomes that of a perpetual and ordered change where the direction and the magnitude of the flux entities may be conserved. Creation and destruction are not parts of this kind of a program. (51) THE PROPERTIES AND THE RELATIONS OF ANY MACROSCOPIC STRUCTURE CANNOT BE MORE THAN THE SUMMATION OF MICROSCOPIC FLUXES. MICROSCOPIC STRUCTURES ARE THEREFORE ALWAYS RICHER IN DETAIL THAN MACROSCOPIC STRUCTURES. PROGRESS HAS INCREASED THE AMOUNT OF THE DETAIL THAT THE OLDER PHILOSOPHERS NEVER KNEW EXISTED. We may be appalled by this detail but it is as real as anything we see or feel. The disconcerting feature of atomic philosophy is that all the flux of the macroscopic units must be partitioned among its atomic constituents besides all that has been dropped by exterpolation.

Specialists have frequently objected to the idea of predestination on account of the great detail of structure that is required. But the idea of any entity being destroyed or annihilated is just as difficult. (52) THE LABORATORY PROBLEM OF PREDESTINATION IS DUE TO THE ENORMOUS DIFFUSION OF THE RECORDS OF THE PAST AND THE PROPHETIC ELEMENTS OF THE FUTURE. THESE ELEMENTS THEMSELVES ARE CONSERVED. Predestination is essentially the same problem as that of the relations between the entities and the problem of the force fields. Flux is itself the record. Flux carries predestination. The problem of philosophy is to read predestination in the flux and the properties of the entities. (53) THE MOST FUNDAMENTAL LAW OF MODERN SCIENCE IS THAT OF THE CONSERVATION OF ENERGY AND WITH A CORRESPONDING LAW FOR THE CONSERVATION OF THE FLUX OF THOUGHT WE HAVE PREDESTINATION. VITAL ENTROPY IS RELATED TO PREDESTINATION LAWS AS IS THE SECOND LAW OF THERMODYNAMICS IN AGREEMENT WITH THE FIRST LAW. When Darwin said that he could not see how it was predetermined that a particular bird should swallow a particular gnat at a particular time,

he spoke the superstition of the specialist. Why were particular nerve cells carrying those particular electrical waves to the pen in his hand at that particular time and particular place? The answer is easy, because the bird swallowed the gnat. (54) THE INTERPENETRATION OF EVERY DAY UNDERSTOOD CAUSE AND EFFECT IS SO OVERWHELMING THAT THE ONLY OBJECTION TO PREDESTINATION IS THE ONE OF DETAIL AND THIS IS A MATTER OF LABORATORY DISCOVERY THAT CANNOT BE REFUTED. Why should we postulate creation and annihilation when there does not appear any laboratory evidence in their favor? Does "spontaneous origin" and destruction explain any more than the External Atlas that supported the earth for the Greeks or the External Gravity of the Sun that we use instead? Even if there are External Forces the trend of modern philosophy is to emphasize the transformation that changes the "external" entity into an "internal" entity.

What seems Reality
Is but t, x, y, z.
No. No. All that can be
Is changeless Entity.

Space Time's but Effort Willed,
Is emptied or is filled,
"Twisted" and Light beam "trilled,"
An Ether "moved" or "stilled."

What Space Time "means" our "words" decree,
"Before" we See "where" do we "be"?
"After" we Die "whence" do we "flee"?
The base of thought 'twill not be "free"
Till we our Earth Conventions "See,"
All objects to our Wills agree.

## VI. (20) STEADY STATES, CATACLYSMS, CYCLES AND CYCLONES.

Entities are not isolated into "absolute" unities. There are always variations in space "magnitudes," or time "events," involved in the isolation. An electron exhibits boundary conditions. A periodicity presents variations that involve time. Because there have been an innumerable number of surface conditions and periodicities it has seemed natural to make space and time the Independent quantities and describe the surface conditions and the periodicities as functions of the time. The great simplifications of the new philosophy, in viewing all surface boundary conditions as electric fields involving periodicities that are atomic, in the same sense as the electrons, presents a very simple view of the structure of these phenomena and removes the position of space and time as the only conceptions of simplicity that interlink the vast multitude of phenomena. ((55) SPACE AND TIME BECOME ARTIFICIAL UNITIES THAT SHOULD BE MADE DEPENDENT VARIABLES WHERE QUANTA OF ENERGY AND THEIR VARIATIONS ARE MADE INDEPENDENT QUANTITIES.

There are many relations that are involved in the general conditions of relativity and it is the aim of atomic philosophy to reduce these to ultimate relations. Idealistic mythology pictures consciousness as arising spontaneously from a condition of uniformity when it differentiates between itself and that which it contains. Here we have the primeval trinity of consciousness, that of which it is aware and the relating third. Every relation appears to be a trilogy. A Newtonian Particle or an electron has assumed boundary properties that are involved in the absorption and the emission of energy. It has been common to consider that these boundary conditions enclose at least one entity such as an electron or a positive nucleus. The other energy Container and the energy itself, not being associated with the boundary conditions, are "without" the boundaries, independent of the boundaries, ethereal, intanglible and invisible. Space is altogether electrical from this point of view. The boundary conditions are always assigned to the electrical specs of the objective world and hence energy quanta and sounds are made independent of these boundary conditions, unrelated to space and functions of time only. The reason for this condition of things is due to the

simplicity of our soul awareness as compared to the innumerable population of electrons. In national history the king plays such a preponderating a part because there are so many of his subjects and simplicity gives incorporeality to the king and makes him coextensive with his kingdom. If an electron was conscious it would undoubtedly neglect its own boundary conditions, which would appear as a factor of all external flux, and attribute all boundary conditions to the external electrons and positive nuclei. The home of consciousness is "therefore" unbounded, ethereal and invisible. Until two souls commune together directly and discover each other's boundary conditions, the ethereality of subjective phenomena must continue. The power of consciousness appears to be that of Directing the quanta of energy. The subjective meaning of to "Direct" is intimately related to Direction as regards so-called space. To proclaim that the soul cannot know the structure of these energy quanta and the process by means of which it directs them is seemingly contradictory. It may be true that only the macroscopic process is a conscious one, whatever this expression may mean, and that the microscopic power is a subconscious one in reasonance with our bodies and that mortality and macroscopic are synonomous. Immortality and the microscopic thus lead us to the subconscious. To Feel, to Know, to Think and to Will are intimately related to the Absorption, Partitioning and Emission of energy by the equilibria of the organic molecular complexes of our bodies. Death may only carry us into the subconscious and the microscopic.

The conception of the functioning of boundaries in the subjective and the objective world is illustrated by the employment of cources, sinks, centers, neuclei, particles, points, absorbers, emitters, atoms and electrons in science and regions of singularity in geometries such as those of Riemann. Apparently about all the boundary conditions in the objective world are those made up of the boundaries of the negative electron. The boundary conditions of the positive nucleus is so hidden and shrouded by the electrons that they are seldom involved in the macroscopic events that take place about us.

At present no conception has been offered as to a spatial description of the quanta of energy that are entrained or concealed in the potential form within the boundaries of the electrons and the positive nuclei. In the ether these are given the velocity of light. In a slowly moving electron we may ask whether the quanta preserve their structure and their characteristic light velocity? An electron may be an aggregate of quanta that resembles the gas contained by a soap bubble. The velocity of light may be as applicable for energy in the kinetic and potential forms as it is in the radiant form. These

may be conditions of the subjective as well as of the objective world. Phenomena are thus made democratic. Subjective phenomena need not arise from a single Adam or cell of protoplasm any more than does all the salt crystals need to arise from a single primitive salt crystal. For a cooling earth there may have been one first salt crystal. But it may be asked whether the earth is really cooling? Any way the existence of salt crystals is of little concern to the positive nuclei of the atoms. May not our present state of consciousness of the macroscopic world be of as little concern to the subconscious life of the soul?

Our experience indicates that structures are essentially steady. The fern leaves in the coal have maintained an invariant macroscopic form for millions of years. Only a very few inches of the outer boundary of the solid earth, the soil of the plants, is subject to comparatively rapid change. Only a few feet of the earth is subject to the daily temperature changes. Amongst these surface atoms the uranium atom remains a uranium atom for billions of years. Apparently the electrons of a mass of uranium matter have never changed. Cataclysms come when the coal is burned and the uranium atom becomes radioactive. An inventor may have the inspiration to make a match that will burn a coal bed, a cyclone of macroscopic events following from some mental event in the microscopic world. A ray of sunshine may cause a surface of the coal to sparkle with the colors of the rainbow or excite the phosphoresence of a uranium crystal without destroying any of the historic structures of these bodies. These phenomena are cyclic with the periods of the light beams. Sleep is cyclic and death is cataclysmic as regards our bodies. Sleep may be cataclysmic when the cell or subcellular life is considered. The microscopic events that take place at the boundaries of the entities are usually cyclic and only rarely cataclysmic. In the latter case the entity is dissociated. (56) DUALITY PLAYS A FUNDAMENTAL ROLE AS WELL AS TRILOGY. OPPOSITELY DIRECTED ENERGY QUANTA NEUTRALIZE EACH OTHER, ELECTRONS AND POSITIVE NUCLEI CONCEAL THE FIELDS OF FORCE. Equilibria, causes and effects and their boundaries, chemical reactions, the balancing of forces in steady states, sex forms, the bilaterial symmetry of many forms of life as our bodily organs, good and evil and the two party system are examples of these inner structures that a common external environment can only partially harmonize in a macroscopic world. So we may argue that if our future life is microscopic the distinction between good and evil will be much more marked than it is in this one.

Present physical relativity theory is altogether restricted to macroscopic conditions and applies only to the state of motion of very complex bodies. It includes the assumption that consciousness or subconsciousness cannot recognize its motion or its potential energy, the alphabet of its own language. If we are to assume that the language of the soul is that of the quanta of energy then consciousness in present relativity theory would be related to the macroscopic state of energy. Present relativity theory postulates the electron as insensible to its absolute content of kinetic energy and as being unaffected internally by this energy. It even asserts the same impotency of consciousness to perceive acceleration. This means that the electron is not conscious since the only flux that its consciousness could experience would be that of absorption and emission of energy. (57) CURRENT RELATIVITY THEORY ASSERTS THAT MOTION ENERGY CANNOT BE RELATED TO CONSCIOUSNESS ELSE THE ELECTRON OR AN OBSERVER WOULD FEEL ITS OWN MOTION ENERGY. SUCH A CONSCIENCE IS DEAD IN MANY WAYS. Processes such as centrifuging may experimentally decide whether consciousness is any function of the absolute motion of the soul. In the meantime we can assert that life is associated only with the low velocity world. The molecular world is very unstable under conditions of collision and it is for this reason that the material bodies dissociate if their velocities even approaches that of the air molecules. (The possibility of life being caried between the planets is dependent upon its stability.) The very microscopic or subconscious powers of the soul would appear to be the very ones denied to it by present physical relativity theory. (58) PRESENT RELATIVITY THEORY IS MACROSCOPIC IN THAT IT ASSUMES THE PRESENCE OF OBSERVERS UPON ITS BODIES THAT ARE MOVING WITH VELOCITIES THAT APPROACH THAT OF LIGHT. This is at present an altogether ultralaboratory condition. Even if we suppose that automatic recording apparatus can be placed upon the moving body we are yet limited to the condition where this automatic apparatus is stable. (59) IF WE ADMIT THE PRESENCE OF AN OBSERVER UPON THE MOVING BODY THEN IT IS LIKEWISE JUSTIFIABLE TO ASSUME THAT THIS OBSERVER CAN HAVE A PERMANENT ABODE ON THE BODY AND CAN KEEP A PERMANENT RECORD OF ALL THE PHENOMENA THAT TAKE PLACE DURING CATACLASMIC EVENTS AND TO RECORD ALL THE ACCELERATIONS OF THE BODY BY WHATEVER MEANS EXPERIENCED. By projecting these observations as far back in the past as we like we can

approximate the energy content of the body as closely as we like. (60) OUR CONSCIOUSNESS AND THE SENSES ARE COGNIZANT OF ACCELERATIONS. The question can be asked as to whether the soul feels acceleration. (61) AS SOON AS WE ADMIT THE QUANTA OF ENERGY TO BE THE ESSENTIAL LANGUAGE THAT RELATES THE OBJECTIVE AND THE SUBJECTIVE WORLDS WE ASSUME THE CONDITION OF KNOWLEDGE OF ABSOLUTE MOTION TO THE DEGREE OF APPROXIMATION THAT THE RECORD OF THE PAST PERMITS. AS THE SOUL IS NOT ASSUMED TO HAVE A BEGINNING BUT TO BE A PART OF THE CONTINUOUS STREAM OF CONSCIOUSNESS AND AS IT IS NOT TO BE SUPPOSED THAT ANNIHILATION IS A MICROSCOPIC EVENT IT FOLLOWS THAT THE NATURE OF ABSOLUTISM IS UNIQUE, ONLY CATACLYSMIC EVENTS INTRODUCE RELATIVITY INTO THE RECORDS OF ENTITIES BY ENERGY CHANGES AND THE PROFIT AND LOSS ACCOUNTS OF THE CATACLYSMIC EPOCHS ARE ASSUMED TO BE A MATTER POSSIBLE OF ABSOLUTE RECORD. This record includes that of recognizing the quanta of energy that are lost or gained. From the nature of our assumption of the microscopic structures it follows that even the internal quality of the electron is a mater to be cognized. (62) THE ULTIMATE CATACLYSMIC EVENTS ARE THOSE OF ENERGY QUANTA ABSORPTION AND EMISSION. CONSCIOUSNESS MAY BE ESSENTIALLY THIS PROCESS SUBJECT TO A CERTAIN DEGREE OF "MANIPULATION" OR IMPERATIVE POWER.

(63) MODERN PHILISOPHY ENCOUNTERS MANY CONTRADICTORY TENDENCIES. ONE TREND IS TOWARDS MAKING ALL FLUX A PROCESS OF THE DISTRIBUTION OF KINETIC ENERGY. THEN COMES A THEORY, SUCH AS THAT OF PHYSICAL RELATIVITY, THAT POSTULATES THE IMPOSSIBILITY OF THE DETECTION OF THE KINETIC ENERGY OF AN ENTITY EXCEPT BY COMPARISON WITH ANOTHER ENTITY AND THEN EITHER ONE OF THE ENTITIES MAY BE ASSIGNED ANY QUANTITY OF ENERGY WHATSOEVER. ALL PHENOMENA ARE PICTURED AS ENERGY EXCHANGES AND THEN IT IS ASSUMED THAT WE CAN NEVER KNOW THE ATOMIC STRUCTURE OR THE QUANTITY OF ENERGY THAT IS CONTAINED BY ANY BODY. AT THE SAME TIME THERE ARE LABORATORY INDICATIONS THAT ALL THE VISIBLE OR TANGIBLE UNIVERSE IS MADE UP OF EITHER

NEGATIVE ELECTRONS OR THE POSITIVE NUCLEI OF THE HYDROGEN ATOMS. THE SOUL MUST THEREFORE BE INTIMATELY RELATED WITH THESE ELECTRICAL PARTS. IN A SENSE IT MUST BE ELECTRICAL. THE FUNDAMENTAL QUESTION IS WHETHER THE STRUCTURE OF THE VITAL ENTITIES AND THE SOUL IS ESSENTIALLY THAT OF THESE ELECTRICAL PARTS. SCIENCE HAS THUS MADE THE PROBLEM VERY "SIMPLE." WE ARE LED TO THE PARADOX THAT THE SUPPOSED PERMANENT ABODES OF FLUX CANNOT BE KNOWN BY ANY MEANS AND THE THEORY OF RELATIVITY ASSERTS THAT THE ENTITIES OF ENERGY CANNOT BE DIRECTLY KNOWN, BOTH CONDITIONS BEING DIAMETRICALLY OPPOSED TO THE STARTING POSTULATE THAT ALL PHENOMENA AND STRUCTURE ARE KNOWABLE TO THE SOUL. The antinomy is much the same whether we call the ultimate entities Equilibria, Electrical Parts, Abodes, Containers, Sources, Sinks, Emitters, Absorbers, Energy Quanta, Souls, Monads, Spirits, etc. Am I an electron? Does the electron feel the energy quanta that it handles as we handle money? Is consciousness the inner "feeling" of energy absorption and is "willing" the emission of energy? Is space not simply a function of energy flux? Is time not simply an order that relates the flow of energy quanta? Are not terms such as Space, Time and Direction just as much exterpolated unities as world, universe and God? Is there not the same reality and the same intangibility about them all? After all is not reality confined to the entities of the natural language? Is not pleasure a "harmony" of energy flux? Is not pain the holocaust in the ordering of energy? May not both be intimately related to guide us along a Path of Minimum Distance in the Entropy Route? May not Fields of Force be Polarized Energy Structures? We theorize about the steady states of atoms and the constitution of the electron when what we really observe are variations in the structures of the energy that we assume has come from these centers.

All phenomena have, by some thinkers, been reduced to "energy" as the common "Substance" or "Ether." But this resolution supposes an "Equilibrium" in that there must be a "Difference" in order to establish a Polarization. (64) WE MAY ASSERT THAT THE STARTING POINT IS A "DIFFERENCE," AN "EQUILIBRIUM," "SOMETHING" VARIANT. Flux necessitates variability so that no knowable stable polarization exists. The existence of Positive and Negative Electrons also shows that there must be two kinds of polarization at least, two kinds of electric fields,

a difference such that, overlapping, the two kinds result in a partial neutralization. (65) PHENOMENA REQUIRE A TRINITY OF ENTITIES, A VARIANT EQUILIBRIUM, IN WHICH THE LANGUAGE OF THE TRINITY CONSISTS OF THE CONTAINING ENTITIES AND THE TO AND FRO VARIATIONS. The containers must be different else there could be no means of numbering them, hence the trinity. Space, time and energy form a trinity in classical mechanics. Energy may be assigned the Trinity of Direction.

All phenomena, including noumena, may be considered as Equilibria. The atomic scale is one of Equilibria. All states of consciousness and of objective world aggregates are Equilibria in many multiplex combinations and are at least partly "reflections" of each other. Stable Equilibria are spoken of as steady states. How complex atoms are, is indicated by the assumption of the Bohr atom, that there is an almost innumerable number of stable states. The complexity of the language of the atom, its spectra, is taken as a measure of the complexity of these steady states. Their steadiness is measured by the millions of years that the atom may exist in comparative stability, as in a piece of coal. The richness of the flux language is implied in the condition that the given steady state of the atom of coal, while it records the geological history of the plants for millions of year also speaks of the flux of the rotating earth; its wobbling about its axes; its revolution about the sun and the motion of the solar system through space. It is not a dead "Consciousness" but one that "Feels" many experiences.

Cataclysmic states occur infrequently, as during collisions, during the dissociations of atoms by radioactivity and perhaps internally when one discovers, invents or decides anything such as philosophic conversion in birth and in death. Such a state is usually considered as existing in Equilibria of the same order of complexity. The flux involved during cataclysmic states usually loads one entity at the expense of another. A good man converts a bad man at his own expense. A Republic tries to democratize its enemy Kingdom in a war and the Republic becomes an autocracy. The energy and vision of genius is largely neutralized by the apathy and blindness of the specialist food-raiment-shelter species of genus homo. A Laborite in a Responsible Position becomes an Elder Statesman. The Operation of the Vital Entropy is so discouraging to the ideal philosopher because its integration includes so many terms. It is the essential Power of this Entropy to be able to cast out these undesirable terms itself. This is "Freedom."

The ordinary man is common because he has compromised himself so much. To do anything worth while one must hide

oneself in the wilderness. Necessarily, while the specialist is with us ,we cannot be understood by the rank and file. The "popular" man "must" be much compromised. Christ and Newton can be understood by only the few. The way of the inner imperative of life is "narrow and few there be that find it." To be a Man means that one is not understood by men. Yet "the proper study of Mankind is Man." The pollen genes make the acorn and the oak. The sperm and ova made Napoleon and he unmade Europe. The ion made possible the spark that burned a dozen cities and the forests on a hundred hills. The vital cyclones and cataclysms, by the operation of Freedom, Wisdom and the Soul Power, are to be described by the methodological action of a "vital" imperative. In some way the Vital Imperative is to sweep a new philosophy into the minds and hearts of men. We must remember that a billion years does not affect the apparently imperturbable uranium atom in its goal towards an explosion of its pent up feelings. How much more consistent should be the imperative of the immortal Soul of a man.

Cyclic states show the oscillation of the "Equilibrium" and introduce Inertia. It is illustrated by the oscillatory character of the spectra. The revolution of planets about their axes and about their central suns or the swinging of the pendulum are classic examples and these are frequently painted as Parable Pictures of the structure of the atoms. In the case of the atoms there appears to be a very intimate relation between the constitution of energy, the frequency of the cycles and the Nature of the Steady States and this is now expressed by the law of Planck. The ultimate quanta of energy would then be related to the ultimate equilibria, and their cyclic properties. It is then the frequency quanta of energy that provide the basic language of the soul. These frequencies as they appear in a phonetic language are only an infinitisimal part of the language of nature ,the flux of energy.

(66) IT IS A CENTRAL METHOD OF SCIENCE TO STUDY ALL ENTITIES, FROM STARS IN THE SKY TO ELECTRONS, BY LEARNING AND COMPARING THEIR PERIODICITIES. THE ENERGY QUANTA INTERPRETATE THE NATURE OF THE STEADY STATES.

Cyclones are chains of cataclysmic states that unloose the higher and more macroscopic or an almost infinite array of neighboring equilibria that include them as parts. It is illustrated by the cyclone or tornado in the atmosphere that arises in some insignificant air disturbance and this upsets an unstable macroscopic equilibrium. Radioactivity is an example. The second law of thermodynamics may be the description of a universe settling down to a more stable state of equilibrium.

The evolution of the sun, the stars and the nebulae may be cyclonic. These changes need not be cyclic at all or they may be cycles of a very long period. But we cannot think of Death and Stagnation: Flux itself of all "things" is conserved. It only oscillates between macroscopic and microscopic forms.

The nature of the life imperative is assumed to operate as a cyclone in that it starts among the finest grained equilibria and wells up through the more macroscopic equilibria. Because a certain sperm met a certain ovum we have Napoleon changing the map of Europe. The "success" of the cyclone of course depends upon the existence of unstable equilibria that it can upset or direct. For example the power of the animals is due to the unstable energy compounds that the plants have manufactured. With Leibnitz we might assume that the electron Points are merely Points of will, of Intelligent energy, sources of cyclones, and such sources that depend upon a peculiar setting of equilibria. Two electrons are individual because their energy content is different yet electrons and energy quanta are Standardized and their parts are interchangeable.

With Bigness we're concerned,
World Science shows us learned.
But life's goal's only earned
Within a seared soul burned.

Our "clocks" are made by "rods" quite fine
To keep the Time. Our "rods" in "line"
Give Length while light takes "time" to shine.
To "measure" then we must define
Invariant "units" of design
That fus'd Space Times give in outline.

Why insoluble Base
Force field or "curved" Time Place,
With yours interlace
To "form" one "flat" 5 Space.

## VII. THE STRUCTURE OF THE UNIVERSE

(21) **The Nature and the Boundaries of Space.** The whole universe appears as a structure of stars and nebulae associated together as in our Milky Way. The same matter atoms, the same radiant energy structures, the same ether and electrical forces pervade the whole universe and are subject to the same laws as are found to hold in our laboratories. There do not seem to be any boundaries to the universe at all. A billion and a half of telescopically visible suns radiate the Harmony of their Supreme " Designer " through the depths of space.

The stars exhibit the operation of a most wonderful equilibrium of sorting agents or forces; of natural selection and a partitioning of energy that is at the same time most macroscopic and microscopic. Large parts of the Milky Way consists of two streams of star systems moving through one another and here we have a most extensive example of partitioning of energy. This partitioning of energy may be ascribed to the diffusion of radiant energy through space and even the evolution of the stars and of atoms has been sought for in the condensation of the radiant energy. The uniformity of the universe is to be attributed to the action of radiant energy and the surface conditions that exist on the heavenly bodies rather than to the intermixture of the matter of the universe, although the latter is continually taking place, but apparently at an almost infinitesimal rate compared to the distribution of energy.

The enormous size of the universe is illustrated in the size of the Milky Way, the largest diameter of this disc like structure being estimated to be 300,000 light years. The globular star clusters in the Magellanic Clouds at the south pole of the Galactic Way appear to be the most distant of the stars and these may be the celestial archipelagos or the star island universes (of Wright, Kant and Herschel) of space. Some of these clusters contain 100,000 or more stars. Shapely gives a diameter of 3,000,000,000,000,000 miles to the cluster M3. The enormous distance of some of these clusters from the earth is comprehended in the case of the Star Cluster N. G. C. 7006 which is 67,000 parsecs, 218,000 light years or 1,200,000,000,000,000,000 miles. This distance is 40,000 times the distance of the nearest star, Alpha Centauri, from our solar system. N. G. C. 7006 is ten times as far away as one of the nearest of the clusters of the great Omega Centauri. These clusters are

composed of giants and possess very great velocities. The spiral nebulae N. G. C. 4594 has a velocity of 800 miles per second. The average velocity of the recorded 15,000 spiral nebulae is 500 miles per second.

Althought there is considerable matter distributed through the universe yet the outstanding feature is that there is such a uniform condensation of this matter that Lines of Radiant Energy Quanta 1,200,000,000,000,000,000 miles in length maintain their direction, their magnitude and the structures of their energy quanta invariant for 200,000 years. These quantities of energy are so microscopic that it requires hours for the light that the largest telescopes can gather to affect the most sensitive photographic plate. In these lines bundles of radiant energy through the depths of space is recorded the surface histories of millions and millions of star records that are hundreds of thousands of years old at least and that are scattered over the whole universe. Such is the vastness and the intricacy of the external relations between the electrons of the universe. Such is the Electromagnetic history of the universe.

If there were no boundaries to space; if stars were distributed everywhere; if there was no appreciable absorbent material in space and neglecting the Einstein effect, the sky would be a continuously illuminated surface. As this is not the case, we can consider that there may be boundaries to space, that most of the stars are located in our Galaxy or that there is appreciable absorbent action either by the matter or the ether of space or by the contortion of the quanta motions. That the ether medium does influence light is shown by the Einstein effect, the gravity field of the sun refracting the light waves an appreciable amount and decreasing their velocity. The streams of radiation of space are constantly crossing gravitational shoals that cause a long period twinkling of their light (small compared to what we see as caused by the air) and they undoubtedly contain other records of their long journeys.

The theory of physical relativity definitely asserts that space is not the Euclidean space where two parallel lines never meet. The "lines" are caused to meet at points within a "measurable distance by the presence of mater. Eddington has calculated that a globe of water of 570,000,000 kilometers radius would cause "space" to curve back into itself. There might therefore be different and electromagnetically isolated "spaces," "worlds" and "universes." So we might extend the picture to make the Totality to contain many worlds and heavens connected together only "spiritually." The light from a star should come to a "focus" on an antistar at the opposite "side" of the universe. Thus the firmament might

be filled with antistars and all electromagnetic radiation imprisoned within our own space. De Sitter has removed the necessity of assuming antistars by considering that time is "curved" as well as space. Time would "stand still," as Joshua would have had it, at points a quarter of the way around the universe as compared with time on the earth. It would take an infinite time for light to go from a star to its antistar, in other words antistars would not then be formed.

Another element of the new philosophy that has its inspiration in the cosmosgony of Genesis is "Let there be light." With the fundamental system of units time is a variable dependent upon the frequencies of electromagnetic radiation. Time thus originates with light. A space in which all energy existed in the potential form would necessarily be void to the motion type of soul. The All in All, the God of Totality, the Creator of "Worlds," "Spaces" and "Universes" might easily Design a Heaven that was not electromagnetic.

Like other fields of atomic structure there is a host of "families," clans, nations and races in the society of the stars. A great star cluster like Hercules contains 100,000, visible stars in a region 350 light years deep. In it are giant suns whose volumes must be a hundred thousand times that of our own aged luminary. The masses of the stars do not appear to vary in any such a way as their luminosity or their size. This condition would be expected if gravitational attraction is screened by matter.

According to estimates of the relativity theory of a finite universe in a Riemann "curved" space the diameter is some 1,000,000,000 light years.

## VIII. STAR CLUSTERS, PLANETARY PHENOMENA, MECHANICS AND THERMOCYNAMICS

(22) **Classical Mechanics.** The smaller star clusters, the solar systems and the phenomena involved in the evolution of planets and suns as well as the surface phenomena on these bodies can be described by the laws of mechanics and thermodynamics. These sciences include the classical mechanics of Newton, the laws of gravitation by Newton, the laws of classical thermodynamics and the laws of radiation. The Phenomena are considered from such a macroscopic point of view that the laws of electromagnetism and the properties of the atoms are usually neglected.

The laws of mechanics have found a wide application because of their microscopic character in that they describe the motion of individual Particles and do not neglect the vector character of the motion. A Particle is any portion of matter from a star to an atom and in the classical mechanics the mass of the Particle is always assumed to be constant, which it is with great precision at the lower velocities. It is taken for granted that there is no energy interchange between the ether and the moving Particle. A Particle continues in a State of Uniform Motion in a Straight Line or in a State of Rest for ever unless Compelled by " Force " to Change that State. Change of Motion is proportional to the impressed Force and takes place in the Direction of the Straight Line in which the Force Acts. The Mutual Actions of two Colliding Particles are Equal and Oppositely Directed. These laws may be taken as definitions of Lines, Forces and Collisions and involve the assumption of the invisible Force Fields in terms of visible motions. The uniqueness of our laboratory systems, as they apply to the motion of Particles, lies in the fact that the light beams used for the measurements of the Motions have an infinitesimal effect upon the motion and the velocity of light is infinite compared with that of any rigid Particle that can be seen. The law of gravitation, if taken literally, assumes that there is a gravity field of attraction between any Particle and every other Particle in the Universe. Here the invisible structure necessary to explain all this complex of external relations is certainly greatly exterpolated yet these laws form the basis of the most exact of the applied sciences, that of celestial mechanics. The practical success of the actions of forces at distances does prove that the ether medium is the

container of very minute structures compared with that of the Particles.

(23) **The Nebular Theory of Celestial Evolution.** The nebular hypothesis (Kant 1755, Laplace 1796) assumes that the heavenly bodies are the result of the condensation of matter in the nebulous form that had formerly been diffused over enormous areas of space, many of which nubulae can be seen beyond our solar system in various stages of their life cycle. This nebulous cloud itself may be due to the formation of matter involving the evolution of the matter atoms out of the radiant energy that became entrained in that portion of space like sea-weed in a Sargasso. If such is the case, then it would be expected that the same kind of matter would be evolved in each star system and that the sorting agents that determine the nature and the size of the heavenly bodies would be much the same, determined by the nature of the radiant energy of space, a form of structure that is the most widely diffused and uniform of all the phenomena of the universe. These phenomena are very microscopic as well as macroscopic and involve such effects as that of the formation and grouping of the many atomic system, the mechanical pressure of radiation and all the electromagnetic effects.

The later phases of evolution of incompressible liquid bodies as they are most familiar to us, consist of the formation of spheroid, ellipsoid, pear shaped bodies, binary stars, rings like those of Saturn, planets and fission of the central nucleus into a cluster. In these stages there are sun spots, cyclonic storms of great violence, tides, the formation of continents on the cooler planets, the radiation of enormous quantities of heat by the suns, solar and planetary electric and magnetic effects and gravitational and radiation forces. (See J. H. Jeans in Science Abstracts).

During the long periods of evolutionary change there appear steady states in which a most wonderful balancing of forces is exhibited. The earth and the sun appear to have been almost perfect thermostats for hundreds of millions of years. The oxygen and carbon dioxide content of the earth's atmosphere and the nature of the sun's atmosphere has been maintained with the same degree of constancy as has the temperature. The presence of life on the earth has meant the existence of a long array of intricately ordered stable equilibria, the infinite multitude of these equilibria and the exactness of their balancing is but faintly understood. The soils, the diffusion of the carbon, oxygen, nitrogen, phosphorus and iodine atoms of plants and animals, the succession of day and night and the dependency of life forms upon these, are well known. The time involved in these stages of sun and star

cluster evolution is most likely as large, comparatively, as the distances that describe the celestial spaces. This is the more likely the case because the evolution of the most radioactive matter atoms of uranium and thorium requires billions of years. These evolutionary processes may be cyclic or cyclonic, paralleling the sun and star cluster evolution.

The hypothesis of nebular evolution must be essentially electromagnetic in proportion as it is related to high temperatures, radiation, the ionization of molecules and atoms and the evolution of the matter atoms themselves. The earlier stages of the condensation of nebulae require rare gases and here ionization phenomena become very marked. It has been stated that forty per cent of the calcium atoms over the photosphere of the sun are ionized. In the chromosphere, where the pressure is less than a ten thousandth of an atmosphere, the calcium is almost entirely ionized. Hydrogen and helium are not ionized until the temperatures are much higher, helium requiring above 16,000 degrees Centrigrade. The final stage of stellar evolution appears to be a burned out star and, by some, the universe is a cemetery of dead stars much more numerous than the luminous suns.

The larger phases of star evolution include the temporary stars such as the Novae, the iregular variables of long periods and with an average intensity about fifty times that of our sun, the short period variables or the Cepheids and the eclipsing or the spectrocopic variables with periods of a few days. The Cepheids are very bright, varying from a hundred to ten thousand times as bright as our sun. Their periods range from a few hours to a hundred days, periods of twelve hours and three days being the most numerous. In the Galaxy, new stars appear every few years while in Andromeda they come every few weeks. Shapley has proposed the theory that the approach of a star cluster into the Galaxy produces a disintegration of the cluster. These evolutionary changes of the stars, and especially the formation of the new stars, are the most cataclysmic or cyclonic phenomena that science has observed.

The connecting link between the forms of life and those of the material systems of space has been suggested by Kelvin. He proposed the view that all life forms may originate from spores that have been carried through space from one planet to another and from one solar system to another by means of the meteors and that the very low temperature and the penetration of the gas atmosphere of a planet would not necessarily destroy this spore form of life. The German gun that was employed to bombard Paris, at a distance of some eighty miles, indicates that communication through space is possible by means of projectiles that explode successively as well as

by means of electromagnetic signals. Sidereal and life evolution may be processes that are much more intimately related than what would result in our own earth alone. Our life forms may contain hereditary records of evolutions that have taken place on other planets or black bodies in space. The uniformity of the distribution of the largest star entities and the smallest electron and positive nuclei entities throughout space persuades us that the other entities of the atomic scale are correspondingly dispersed. One form of communication with a planet like Venus would be the erection of a large reflecting miror in a desert and then reflecting the image of the Sun upon the planet.

The philosophy of cosmic evolution is essentially that of "Making." The visible universe is made through the operation of scientific law. It is to be described mathematically. The philosophy of vital evolution is "different." Poets are "born," not made. Men are said to make their own opportunities and carve their own destiny. An inner imperative is added to the conditions of an automatic objective world, Freedom and Soul power are spoken of. Here the environment is combined with the vital spark. Here we begin to see the working of the microscopic.

## IX. 24 THE EVOLUTION OF LIFE

The cellular forms of life evolve in the environment of phenomena such as those of surface tension, evaporation, diffusion, the chemical reactions of many organic compounds, the absorption of energy from the sunlight and the electrical effects such as those of active layers of atoms and molecules. The colonies of cells forming the individual plants and animals are molded more by the environment of the planetary phenomena than are the cell structures. Plants and animals grow symmetrically about the gravitational lines of force; they are frequently as wonderful thermostats as are the planets and the sun; their muscles operate against the force of gravity; their ears hear the music of the winds and the waves of the sea dash upon the cliffs; their taste and their smell are more than the mere detection of the rarest and the mellowest of the chemical reactions as is illustrated in the lives of the dog and the eagle; they are the detectors of air conditions; their hands fashion a civilization that covers the whole surface of the earth and their eyes see the invariant energy quanta as they come streaming down from the depths of space. The evolution of the plants and the animals represents the overwhelming inner force of the Imperative to live over the opposing forces of the Natural Selection of the environment. The theories of evolution usually start with some cellular type of life and at present they are superficial in that they do not explain the nature of the evolution in terms of the known atomic characters.

The Darwinian theory of evolution asserts that the new types of life appear gradually in a state of plasticity and that one variation makes others possible. Natural Selection determines what variations shall survive and what variations shall serve as material for selection in the succeeding generations. Evolution is partly subject to control through our power of indirectly modifying the environment.

The theory supported by De Vries and the idea of Mendelian characters view the changes in the species as appearing abruptly and as possessing considerable magnitude. These spontaneous variations are stable from their first existence and are not closely related to the variations that follow. Natural Selection only takes the role of determining which of the variations shall survive. Other than in this way, it exerts no influence upon the character of the variations that shall

again emerge. This theory resembles the theory of the spontaneous radioactivity or the disintegration of the atoms in that these changes are abrupt and not subject to our control.

In the finer structures of phenomena it is to be noted that the entity systems preserve inviolate their power of taking and giving flux resonance to the environment and the philosophy of the objective world reduces this condition to that of the partitioning of energy. The martyr, burning at the stake, may render himself unconscious of the flames. It is also to be noted that the records of the past and the prophecies of the future are condensed about the particular entity that they concern. It is therefore to be expected that the chain of the living organisms that are so vitally related to each other through the continuity of the generations should contain within themselves the essential records of their past and the variations that these structures shall exhibit in the future. Any control of the chain of life that is essential must therefore be made internally. The Fundamental Imperative connotes the Power that controls the evolution of the entities of life and this asserts that the driving forces of evolution are essentially internal and that the effects of Natural Selection are superficial. The Fundamenal Imperative may appear at present to operate indirectly through the environment for the reason that each life entity has gotten imprisoned by the environment. The Conversion of any life entity to the Imperative is that of aiming for the emancipation to freedom.

In the evolutionary theories of Weismann, De Vries and others, the term Unit Characters, Characteristic Mutations (as opposed to a mutation involving the whole organism), Germinal Variation, Discontinuities of Character and Sudden Gaps in Transformation are used. Evolutionists speak of a "Centripetal migration of preformed gemmules" and their "centrifugal distribution." (De Vries). Which work on Mendelian heredity, cytology and segregation supports the view of unit characters.

The theory of pangenesis of Darwin, De Vries and others assumes that the nucleus is the seat of the heredity complex of vital units and that during embryonic development these vitals, pangenes or genes are set free in the surrounding cytoplasm where they multiply and direct the future of the cell. Whether there is a pangen migration or whether the effects of heredity are carried by a finer and more chemical like process is debated. The question arises as to how the pangens reach their place of destination. Is this centrifugal dispersion automatic or willed? The dispersion in time is just as problematical. How, in all the infinite complex of microscopic detail, does the right pangen reach the right point of the body at the right time of its development? How is all the Equilibria

of sex maintained? How do the pituitary bodies and the suprarenals arise and operate? All these variations in the individual must be taken back to differentiations among the individual cells and even lower. Undoubtedly the language of life will ultimately become exact as we reach the ultimate entities and that the parts of those entities may be standardized and interchangeable so that by their very nature and mutual relations they could not be but what they are an antinomy of freedom perhaps, yet consonant to it, as being law. The Instincts and the Powers of the life entities are of long duration. Through long evolution higher forms grew symmetrically about the gravity lines of force; they fell into harmony with the cycles of the earth's rotation about its axis (day and night) when eyesight developed; they followed the cycles of summer and winter or of moisture and drought; they imitated their thermostat earth; they spoke the language of the wind; they flew; they swam; they rolled and crawled with cilia; they breathed the air, drank the water, ate the minerals and absorbed the sunshine; they harmonized with entropy, with the phase rule, the law of mass action and fell in line with all the cataclysmic, cycle and cyclone neighbors among whom they dwelt. If the Imperative of life found its way so successfully among all this intricate maze of structure of the macroscopic world it is necessary that the same success had previously been met in its more labyrinthian course in the electron, energy and ether worlds. Where it started; whether it ever started; where it goeth; and how it will go; is intimately related to the problem of general entropy. Where did thermodynamic entropy start; why and when did the atoms of electric charge and material inertia evolve; what is the goal of the energy changes, if any; these are all intimately related to the Course of the Absolute Imperative of Life.

The evolutionary processes are essentially microscopic. The iron of chlorphyll and haemoglobin, the compounds of potassium, magnesium, calcium, silicon, sodium, iodine and even manganese, the many flavors, aromas and vitamines for which we crave, are only a few of the members of complex equilibria through which the life urges determine an irreversible path. The variations arising through evolution are not random differences from an invariant norm but members of a grand series of terms, a series that has definite upper and lower limits. The members are all related and it is in the nature of these relations that God is to be defined. Terms such as length, inertia and time are artificial and fictitious. The absolute units, the fundamental relations and the nature of God are the realities. We have not ascertained the structure of the connective tissues that bind together the evolution of events. A Salamander can regenerate an entire limb but a

man cannot. As differentiation becomes more complex it becomes irreversible. Irreversibilty means predetermination. Like thermodynamic evolution, vital evolution is to be described in its larger outlines by an entropy imperative built of porous interlinking structures of innumerable short frequency cycles. We see but a small span of progress as geology exhibits it on one heavenly body. It is in the electromagnetic cemetery of dead stars that the frail macroscopic forms of life develop.

The courses of evolution, the nature of the directive imperatives and the effect of the environment are many. Heredity is undoubtedly a ruling factor. Yet philosophical evolution always insists upon the source of life as being single. If this assumption is granted then the differentiation of the life forms must ultimately be due to the environment. In the progress of men it has been asserted that the varied climatic conditions of the temperate zones are responsible for Western civilization. It is asserted that brain power is a function of the vitamine production of the plants and especially of the dairy products of any region. Yet most of us believe with Rosebery "that an empire is of little use without an imperial race." Life requires hydrogen, carbon, nitrogen, oxygen, phosphorus, calcium, magnesium, sodium, potassium, sulphur, iron and iodine. Many of these atoms must appear in certain molecular arrangements (as sulphur in the sulphurized amino-acid cystine) and no relations between inner atomic structures and the life processes have been noted. It has been said that "Westward the course of Empire takes its way." Westward the vitamines may take their way. The chain of life may be as inextricably connected by vitamines and similarly synthesized centers as an electromagnetic radiation universe is welded by the quanta of energy. The course of vitamine construction is a function of climatic influences, a type of solar and therefore radiation effect.

Old "Mother Nature" has mellowed an ancient regime with many a hallowed chain of equilibria in the microscopic as well as the macroscopic world. Folk lore and mythology carry deep truths. There is a science of farming whose calendar is given by the leafing of the forests and the migrations of the birds. The Bulls and Bears of Wall Street have their rules. Some "vitamine" or "active" constituent of the air makes the mountain and sea so wholesome. (The writer is applying this vitamine for the treatment of consumptives). Beer and wine may have stimulated Western civilization with vitamines. Abel has discovered bufagin, for the treatment of dropsy, through the popular use of toad skin ointment. The cow and the garden, the nitrogen and vitamines of the clover

plants, a land of milk and honey may be the Promised Land of the imperatives of home, country and civilization.

But Father Time is as imperious as ever. The three Fates still sit in judgment.

Our modern civilization does not appear to be essentially any better than the Struggle for Existence as we see it depicted by the Hebrew prophets or the evolutionists. Western progress is largely based upon Production, upon coal, oil, virgin soils and forests, mines of ore and numbers of people. In a few centuries the whole fabric will become an effete product analogous to present Chinese civilization unless it develops along other lines as well. The capitalist schemes for cheap labor and is too short sighted to know that his zeal for the slaving of an inferior type of man means that this low blood will flow into and corrupt his own in a few generations. So fall the pharoahs and the builders of pyramids. So a people degrades itself by trying to multiply as the sands of the sea.

What is a young man or woman to do? The first aim of life should be to develop and perpetuate the inner imperatives of life. We must honor and enrich those who feel such a call to the Kingdom. Dollar values are to be discarded and the world is to be evangelized and be kept evangelized. Bankers and lawyers of the old school would be of no more value than the secretive diplomats and cattle dealers and should become obsolete. The spirit to gambol, to sow wild oats, to attain fame and power and to paint and write will have to be carefully directed. Ambition is not to be allowed to grow wild. It is to be eugenized as well as the countless germs of life. A first problem is that of the church being able to continue in the way of its Christ and not atrophy into worldliness. This may be said to be one of the greatest of all problems. What is the use of building an empire that cannot be perpetual?

In chemistry we have a fairly consistent and complete system of qualitative analysis for every kind of matter and once successful in ascertaining the nature of the constituent elements we proceed to a quantitative analysis. In this manner inorganic compounds can be classified and the materials put to their best use. The problem of the new church and the new philosophy is to so classify and apply the imperatives and the energies of men. So are we to find our vocations and our avocations of life. So are we to make our families and our children. The pandemics of politics, superstitions, words, phrases, sayings, creeds, hymns of hate and waves of exaltation are to be tempered by the universal philosophy of life. We are to know life and to live it abundantly and wisely.

The forests take much more of their strength from the sunshine and the thin air than from the crushed and rotting material about their roots. So it is with the Capitol, the Temple and the Laboratory. Only little men are afraid of the truth. Only dwarfs worship the gods of opportunism, the flesh and mammon. It is just as glorious for a Man to die in the poorhouse as on the Cross. To be "well-to-do" among the tidy Dutch may be as unerring a route to soul atrophy as to loaf with the lazy Irish. The aim of education lies in the realm of imperatives. Knowledge may be dangerous to both individual and community. It is widsom that we must aim for.

In the stillness I was thinking how the will to live keeps sinking
Down the light lanes and the force planes of the world space from shore to shore,
How the cycles and the urges sing their peons and their dirges
Conservations, reservations, just to do as e'er before.

In space and time we may define, curve upon curve, line upon line,
By long equations ever trace x sections of n numbered space,
In all this very plan we scan the image Man has ever ran.
What e'er the way, where'er we stay, in work or play, the will hath say.

Figures, poems, demonstrations, holocausts of lives and nations,
Are denizens of pens and ink, which in the soul doth scarcely sink,
They answer not our Gordion Knot of bitter strife in each lone life,
They are the bones, brown bare tomb stones, that mark the room of some soul's gloom.

In thought and love we ever live below, above, imperative,
Immortal lives do aught but trace world lines of but a web of lace,
A misty maze that doth us daze, a dot, a patch, a view we catch,
Some way, one day, we trust to see the whole as it doth fully be.

However well, a heinous hell doth ever dwell in earthly dell,
Our sacred luck doth run amuck, each other's aims cut dagger pains,
Each Man doth Fall, a ban on all, hell hate, blind fate, does not abate,
The goal of Youth, the Way of Truth, are clouded o'er where e'er we soar.

What shall we do? What goals will rue? What aims will ever run untrue?
The answer comes to him who runs to God above, to life and love,
To talk the language of the soul, to walk with God, to see the whole,
To know the microscopic world from which our present life's unfurled.

## X. CELLS AND HEREDITY

(25) **Cell Structure, Chemical Reactions and Death.** Cells possess a structure that is quite invariant, considering the differentiation of division of labor that is involved in their functioning. The cell wall, the nucleus, the nucleolus, the protoplasm, the cytoplasm, the chromatin bodies, the centrosomes and the cilia are some of the common structures that are usually found as parts of the cell. Assimilation, respiration, excretion, response and movement are examples of the coordinated expressions of activity in the corresponding labors of cell groups that is largely automatic or physiological and chemical. The evolution of the cell from an inorganic structure would appear much more involved than the evolution of the colonies of cells that make the individual plants and animals in much the same way that the evolution of a man was a much longer process than the evolution of the institutions of man. For example it is supposed by some that the individual cells secrete pepsin and trypsin, the digestive fluids of the stomach and the intestines respectively. In other words highly differentiated cells are not greatly removed from the free cell form of life. The digestive action of these fluids is a function of the acidity of the medium and it has been stated that the stopping of breathing destroys a condition that prevents the action of the pepsin and the trypsin in the cell from the process of auto-digestion and that when the breath of life ceases the body digests itself to death. This view makes the condition of life the maintainence of an equilibrium of a chain of chemical reactions.

The cell is macroscopic as compared to the molecules and the atoms ,being about a million billion times as large as the atom. Compared with the electron the cell is indeed a very gross structure. The biochemical changes that can take place in the cell are therefore very varied. The electromagnetic phenomena are in a yet lower microscopic world than the chemical reactions and this field has as yet been untouched. The advances in cell chemistry are illustrated in the artificial production of synthetic indigo, gutta percha, cocaine (whose powerful anesthetic properties depend upon specific groups of atoms in these molecules), salvarsan or arsphenamine (which kills a specific invading germ without permanent injury to its host taking the place of an antitoxin), the monosaccharides, the amino acids, the polypeptids, the gland secretion adrenalin,

the active principle of the thyroid gland (very small amounts of which may preserve health) and the active principles of the vitamines.

Vital entities are not the only structures that perpetuate themselves. Ferments (autocatalytic) do this. The entities of this type are usually viewed as molecular. The smaller cell parts appear unable to exist alone. Among the various cells differentiation appears to be much the same (as sperm, muscle or nerve cells). The law of Remak, 1841, that every cell comes from a preexisting cell, is universal and may apply in a certain sense to portions of the inorganic world. In their early life the cells appear able to change their functions. The cell parts such as the chromosomes undergo many changes but maintain a certain identity through a life cycle. For these parts the more general law of Remak is that a nucleus comes from a nucleus; a chromosome from a chromosome; a chromomere from a chromomere and a gene from a gene. All differentiation (and evolution) appears to be due to different combinations of vital entities (organs. tissues, cells, plastids, chromosomes, chromomeres, genes or subgenes) just as the atoms of matter appear to be combinations of electrons and positive nuclei. Every cleavage cell of the adult body contains one full set of chromosomes from the ova and another from the sperm. Synopsis, or the rules relating to the way the genes and chromomeres combine, fairly rivals our present theories of the structure of the atoms. X ray spectra of the changes of these genes and chromomeres should prove very valuable. Symbiosis, the mutual living of two or more organisms as a partnership as the algae and fungi in the lichens and the necessity of certain (Noel Bernard) mushroom secretions for the development of the "seeds" of orchids, has been emphasized as very important. Portier has pictured symbiosis as relating the food reserve lencites, the grains of chlorophyll and the microbe mitochondries (Altmann) that can multiply outside of organisms (but which require the nutrition of the larger body).

An illustration of the great advance of chemistry in the past few years is that of the fixation of atmospheric nitrogen. a process first found to take place in the root nodules of clovers and like plants by means of germs. Biologists have frequently predicted that artificial photosynthesis of compounds, such as the carbohydrates, may replace the use of plants. Germs have been found that will produce fats and certain proteins in solutions of ammonium sulphate containing phosphorus and magnesium compounds. Almost unlimited visions loom up in the borderland of biology and chemistry. Enzymes, catalysts, eugenics, vitamines, hormones, symbiosis, euthenics, toxins, antitoxins, chromosomes and other branches of microscopic

wisdom promise many revelations to future workers in the laboratory. The atomic and molecular rearrangement taking place in the growth and the development of the cell parts should be made on x ray diffrastion patterns. Vitamines and hormones may be collected electrically and artifically given to patients when needed.

Among the first to see a characteristic biochemical action was Pasteur who found that dextro-tartaric acid was destroyed by ferments while the lævo-acid was not acted upon. These two chemical compounds are exactly alike in constitution, with the exception that the spatial molecular arrangement of the atoms of the one compounds is the mirror image of that of the other compound. A similar case, found later by Fischer, is that only three of the sixteen stereoisomeric aldehyde-hexoses are directly fermentable. An illustration in physical chemistry is the case of Bancroft who was studying the effect of the presence of sodium and calcium oleates upon emulsions of oil and water. By varying the ratios he could change an oil emulsion in water into a water emulsion into oil or vice versa. Almost immediately Dr. Clowes applied these principles to the clotting of blood, to anasthesia, the chemical fertilization of eggs and the coagulation of milk.

The numerous cyclic phenomena such as the daily accumulation and removal of poisonous products, the heart action, growth and decay and respiration require some sort of a time control. Presumably these control devices are of the type of catalyzing enzymes and the discovery of their mode of action is of great importance. The body is not only a mechanical automaton built and acrobating about the gravity lines of force; a thermostat automatically operated through marked external changes of temperature; an engine burning oxygen; a blood pump; an organic chemical laboratory of the greatest complexity; a colony of billions of living and many pseudo-independent cells; an intricately and electromagnetically (nerves) connected system; but above all it appears as a partially constructive, progressive, Free Agent; if not this, it is the Designed Automaton of its Operating Designer.

(26) **Cell and Germ Warfare.** Pathology has paraphrased some of the relations between cells and germs, as they take place during certain infections, in terms of the warfare that fills so many pages of the history of man. In an abscess the offensive is taken by the invading microorganisms that have found tissues favorable to their needs and growth. If these invaders meet with resistance they may secrete poisonous toxins. In this use of poisons in warfare they antedated the Germans by millions and perhaps billions of year.

A few hours after the infection, say by the germ pneumococeus in pneumonia, the blood begins to flood the infected part with a fluid that dilutes the toxins and weakens the microorganisms. The leucocytes or white blood corpuscles come in great numbers, attacking and destroying the invaders. Many of these white corpuscles sacrifically die in the conflict and disintegrate into ferments that stimulate the tissues and stir other corpuscles to follow them in their glory. The munition production plants in the bone land, the bone marrow, greatly increase the generation of the white corpuscles and send them into the infected battle area through the action of "cheriotaxis." The disorganized tissues and the dead corpuscles form the pus, the wreckage of the battle. If the war is favorable to the Allied hosts of white blood corpuscles, the first line wariors are followed by second line construction gangs who clean away the debris and begin the work of the replacement of the broken down tissues. At the same time there is a general advance upon the germs and, if possible, these are surrounded and destroyed.

Here is a warfare that is perpetual and involves billions of billions of life entities. The theory of the action of Natural Selection and the Stupid Orthodoxy of Daintiness Ritual of the Upper Class Women do not yet realize that their Intestinal Flora numbers some 150,000,000,000,000 germs for each of us. Human History is Ignorance Complete as regards the Natural Selection Battle of the Lower Microscopic World. The Toxins of the Enemy Bacteria are perpetually poisoning man to a continual Fall from his Intellectual Garden of Eden. Here are trillions of small Serpents with their toxins (the putrefactive germs secrete poisons similar if not the same as the venoms of snakes while the fermentative germs that act upon fruits are comparatively inoffensive, continually drugging him into pessimism and the despair of the madhouse and of suicide. The Apple Tree of Temptation is inviting men at every meal. The Wood of this Tree is in every Chair that Keeps men from the Open Air and Exercise. The Temptation of Man is a Panorama continually unfolding before his selfish nature calling on him to worship the Kingdom of Food, Shelter and Glorious Tinkling Raiment and so filling his days so that he learns not of the Kingdom of God within.

Much of the Story of the early days of the Human Race was long before enacted in the unwritten history of the cells and the germs. Untold ages ago these cells began to form families, tribes and clans. Long ages ago they Decreed that all Cain cells must be driven from the cell colony midst. Throughout eons they maintained their internal government, while life lasted, free of the Philistine despoilers. Long, long ago cell eugenics, ethics and morality made the inviolate law

of the Medes and the Persians within the cell colony. Laws such as "Thou Shalt Not Kill" and the Meek Cells (subject to the Absolute Imperative) Shall Inherit the Earth ruled the cell tribes millions of years before it was thundered to ignorant man from the top of Mt. Sinai and with love from "the mountain." Here we have Teleogies by the billions of billions centrifuged into Programs of Life. Here we have a Stream of Imperatives ever checking the deadening and drying atmosphere of an apathetic environment. Here we have a Chemical and Vital Entropy Directing the Progress of the life entities. Here we have enacted the Grand Imperative of Life. Here we have the Judas cells implanting their cancerous kisses upon their very Saviour Souls just as in our social states, the feeble, the criminal, the ignorant, the stubborn, the proud, the selfish and the worshippers of Food, Shelter and Raiment grow their cancerous progeny among the very vitals of a striving Christian Society. Here we have the Elder Statesmen of Wisdom; the Pituitary bodies pouring forth Hormones, the Thyroids, the Parathyroids, the Thymus, the Suprarenals and the Peneal Glands mysteriously directing the growth, the building and the civic, ethical and moral lives of the cells of a colony. To the Shame and Disgrace of these Statesmen it must be recorded that there was a time millions of years ago when they worshipped Numbers, Bigness and the Fleshpots of Egypt just as do many of the Specialists and assuming policy majority politicians of today, and then was the earth flooded with all kinds and sizes of Crawling Diplodocci and the air with flying Pterodactyls. But the very outrageousness of such a program was its own downfall. The Inner Prophets renewed their fight to save the true soul Imperative and man was the outcome of their Creation. Man is now groping through his Wilderness of Wondering, seeing here and there a Revelation of New Vision, and holding Faith in an Absolute Imperative.

The Revelation that "Cleanliness is next to Godliness" contains much truth. It is a part of the program of the cell colonies. New born lives are free of germs and the healthy bodies of animals and plants are kept free of injurious matter and bacteria. The biologists have succeeded in raising guinea pigs and chickens that are free of germs. As many as eighty generations of flies have been developed germlessly. Our human suffering is due to the intoxication of toxins, the odors and the stenches of our microbic enemies, the red lights of disease and death. That the Imperative of the cell colonies can successfully hold back this alien horde of assassins is the daily miracle wrought in the lives of each of us. Next to Christianity among the relations of men, the operation of a high type of Christianity among the cells in their colonies is

one of the greatest revelations of biology. The true Inner Imperative of the Kingdom of Heaven is to make biological Supermen of all of us. It is the Innermost Biology that is sacred. Men have seen too much of the heathenish biology of the struggle with the environment and so have come to lose faith. They see the imperative to propagate numbers that ignorantly runs amuck and have lost sight of the higher Eugenics among the non-cancerous and non-reproductory cells. If Sacred Love was Animalized by the production of hosts of seeking sperms it was because of the unorganized environment over which the Cell Law did not Impel. As soon as this outer world is brought within the dominion and the wisdom of the Inner Home Rule, the Imperative will operate the harmony we see in a Grecian Venus of Mind and Body. Men have scorned at the Harmony, the Sacrificial Service and the Christian Democracy of Life among the Cells of our Bodies. They have pointed out the apparent mistakes and the tragedies. But these critics must be swept into harmony with the Absolute Imperative of Wisdom or be cast into the outer darkness of Cain and Judas, of the Bacterium Enemy and the Disobedient Cancel Cells, who cannot control their own lust to murder the sacredness of present and future life. We must learn how to Gas the pneumococcus Apache, to pour out toxins that poison only the enemy, to eugenize our unfit, and to bathe the Faithful with all the Antitoxins of Support that an electrical and a chemical world will provide.

(27) **Nerve Transmission.** The nerves carry the stimuli (received by the senses) to the brain and also various orders from the brain to the organs of the body, such as the means that operate the vocal chords during speech. The process of nervous transmission is undoubtedly physical and the velocity of transmission can be measured. There is considerable evidence supporting the view that the process is one of active electrical layers similar to the layers that form over many solids (molecular anchorages). The fact that all surfaces contain the electric fields of the electrons (as their outer atmosphere) explains the universal distribution of such surfaces. Lilie (Science, 1919) compares nervous transmission to the changes that take place on the surface of passive iron made so by dipping it into strong nitric acid when it is transformed into active iron by dipping it in dilute nitric acid and touching it with a baser metal than the iron. The action is catalytic and appears due to the change in the nature of the atoms that constitute the atom layers over the iron. The existence of these atom layers on glass is very well known by workers who try to clean glass surfaces chemically and to obtain high vacua. Nerve messages appear as excitation waves, carried

by the electromagnetic waves in these outer layers, in somewhat the same way as telephone curents flow through conducting media or as wireless waves bend around the earth. Memory may consist of more or less permanent active layers in the brain folds, photographs one molecule deep, upon which the mind's eye reads the past. Evidently the disagreeable photographs are not as permanent as the pleasant ones and use improves the records rather than wearing them out.

Being electromagnetic, the Nerve Language must be written in the words of Energy Quanta, of the Electrons, of the Steady State Structures of Atoms and the Frequencies of the Waves that go up and down all these routes of energy change. (62) THE BASIC STRUCTURE OF THE CHARGE OR FIELD OF THE ELECTRON, THE FREQUENCIES OF ELECTROMAGNETIC WAVE MOTION AND THE ENERGY QUANTA, ARE ASSUMED TO CONTAIN THE ULTIMATE SET OF UNITS THAT BIND TOGETHER THE OBJECTIVE AND THE SUBJECTIVE WORLDS.

(28) **Heredity.** Heredity, Intuition and Instinct are terms that we see in their laboratory demonstration before our very eyes every day. Every father has seen its operation as a marvelous panorama in the unfolding life of the mother and the child. They have been in a perpetual flux throughout the geological ages. The Entity steps in this Teleology are as indistinct as are those described by the Phase Rule and by Entropy. A study of cell Morphology gives us the fossil form or shape of the vital force after it had gone and left but its tracks in the mud of matter. Mendelian laws and the Standardization produced by the environmental forces are macroscopic phases. Here operate almost innumerable and endless chains of imperatives among many equilibria all linked together into one absolute Imperative as fundamental in the flow of the life entities as is the Second law of Thermodynamics absolute in the Macroscopic World of Matter and Energy. The one has the habiliments of an infinite probability just as much as the other. The one is just as surely directed to an unknown goal as is the other. To the one we relate the allegory of a Carnot engine, to the other a corpus callosum (telephone central) of a brain. Yet as the law of our inner being, we are infinitely more concerned with the Life Imperative than we are with the Entropy of the Matter Systems. The problem of man is to absolutely order his imperatives of pleasure, honor, ambition, curiosity, justice, faith, love, hate, anger, hunger, thirst, ennui, loyalty, dignity, and service and the infinite subconscious willings that fill him into an Entropy that will direct him above his environment. We may be even bold enough idealists to have faith that objective

entropy law is dependent upon the life entropy. To do this we must know how and why cells divide and multiply; we must know our sperm and ova relatives; we must get into intimacy with the cell nuclei, the chromatin bodies and the chains of chromosomes. Instead of Business and Base Ball we must watch the cytoplasm and the centrosomes develop chromatic figures; not diamonds for the wedding rings as was the ancient ritual in the Dark Ages but central spindles and astral rays. Get acquainted with the youth and the middle aged chromatin nuclei of Boveri. Learn the laws of change that these structures constantly operate within your body. See the sheen and the glimmer of their loves and willings. Be joyful with them in their enthusiam and in their old days and death support them with your chemical vintages and sympathy. Sperms have been with us as long as thirteen years and yet who ever even tried to wobble a ouija board with them? Behold, Man, Christ said, "the Kingdom of Heaven is within." Knowledge, ethics, morality, art, virtue, love, heredity, intuition, habit, language and philosophy have their only apology for existence as Programs in the Imperative of Life, as Charts of the topography of the Inner Kingdom and as transcendental laboratory Hypothesis to Guide us by a Path of Least Action to our Highest Goals.

It is the faith of most of us that we live in one world, that the vital and the inorganic, the subjective and the objective and the psychical and the physical blend. In the one region we have attained such microscopic entities as molecules, atoms, electrons and quanta of energy. It is certain that we shall learn the role that these entities play in life processes and it is likely that the union of the two worlds is to be found in a yet more far off microscopic country. Biology has a long way to go.

## XI. THE END OF MATERIALISM AND THE ELECTROMAGNETIC WORLD

(29) **The Molecular World.** On leaving the mechanical world one enters the region of evaporation, surface tension, condensation, absorption, crystals, electrolytic effects and the equilibria that are characteristic of molecular changes. Here are the hundreds of thousands of molecules such as one finds among the organic compounds and the complex phenomena that take place during these molecular changes. Here we go beyond mechanics and examine the nature of the changes that Particles undergo. This is the subcellular world. This is the world that the Parable of Evolution would indicate to be the Origin and the Primitive Home of the Stream of Life. This is an Environment of which practically all philosophy is ignorant. This condition is responsible for many of the Antinomies that have arisen in the past. This is the Home of Death( as well as Life) in so far as we Have tracked this Monster to his Lair.

Science has accumulated much evidence in favor of the view that all matter atoms consist of Positive Nuclei surrounded by certain configurations of Negative Electrons. (68) THE SURFACES OF ALL FORMS OF MATTER CONSIST OF AN OUTER SHELL OF ELECTRONS. NO PHENOMENA, EXCEPT THOSE OF RADIOACTIVITY, ARE RELATED TO CHANGES OF THE ATOMS. ALL THE RELATIONS OF COLLISION AND IMPACT CONCERN THE INTERPENETRATION OF THE ELECTRIC FIELDS OF THE ELECTRONS FIRST AND OF THE ELECTRIC FIELDS OF ELECTRONS AND POSITIVE NUCLEI SECONDLY. The generality of the form of the older mechanics is due to the universal distribution of negative electrons on the surfaces of all forms of matter. All matter surfaces consist of electric double layers.

The permanent combinations of the molecules, such as the crystals, are polar because they are unchanging electric field structures. In gases and liquids these polar properties are lost in the macroscopic statistical properties as studied in the laboratory because the particles are in rotation. When the velocities of the molecules exceed certain values, depending upon their character, they are dissociated on collision. (69) THE WHOLE MECHANICAL AND MOLECULAR WORLD IS ONE WHERE THE VELOCITIES OF THE

PARTICLES ARE SMALL. This condition is another reason why Newtonian Mechanical Philosophy, applies so accurately in the macroscopic world where humans move. The partitioning of energy does not alter the electromagnetic field structures in a low velocity world.

Because energy is required for molecules to break away from the surfaces of solids and liquids it follows that these surfaces are regions of denser potential energy, the interatomic or the electromgnetic forces being more intense there than in the interior. Many of the physical, physiological and perhaps psychic phenomena involve these surface effects and make their elucidation very important. The reason that impacts are inelastic and the colliding molecule frequently adheres to the surface of the solid or the liquid is due to the short time required for the establishment of thermal equilibrium and to the fact that the colliding molecule is at first attracted by many molecules and is later repelled by only a few. Absorption is the result of the lag between condensation and subsequent evaporation.

In solids the molecules move about equilibrium positions in simple harmonic motion. The electromagnetic fields of the molecules remain fixed in their direction with reference to the surrounding molecules. The periods of these oscillations are very short, ranging from ten to the minus seventh power to ten to the minus fourteenth power seconds. The time required to attain thermal equilibrium with the neighboring molecules is as short or shorter than the most rapid oscillations. As the solid is heated the electromagnetic fields of the molecules are shifted until finally the rotation of the molecules entirely destroys the fixed nature of these fields and the solid is converted into a liquid. The latent heat of liquefaction goes into energy of rotation of the molecules. The molecules do not move freely in the liquid however but occasionally break away from their neighboring molecules into a new region. When each oscillation, or rather collision of the molecules, results in the complete separation of these molecules the liquid has been converted into a gas.

The operation of the molecular world by the life entities is constantly in evidence. Digestion and the building of the complex protoplasm of the cell are examples. The radiation of light by the fire fly is another important directive power. If life entities can direct equilibria to produce light, as the fire fly does, is it too much to assume that they may be able to do so with the simpler series of equilibria? That the operation of the "vital forces" is concerned with very small quanta of energy and with a continuous plan is in harmony with the fact that they apply only to low temperature conditions. They must, however, involve a certain degree of fluidity else

their effects would be very small. In their character these vital forces resemble the forces of the positive nuclei of the atom or those non-electromagnetic forces that must be assumed to permit of the phenomena of the molecular and the atomic worlds.

(30) **The Matter Atoms.** Until the discovery of the electron, the matter atoms were assumed to be the ultimate entities of the natural world. They were assumed to have been once created and then to have remained invariant ever since. The functions of life necessarily could not extend beyond this absolute barrier. On this view it was natural to assume that the boundaries of the physiological functions and those of the atomic world were one and the same. These physiological processes were molecular. It is true that they were abruptly limited by temperature, a temperature a little above the boiling point being fatal to all life forms, but the vital powers were known to operate with atoms and thus covered the then known range of the microscopic world. The new physics of the electrons and the constitution of the atom has re-introduced the problem of the range of vital force and this is now one of the most important of laboratory problems. Like other forms of philosophy there is a continual change of vision as this extends beyond experience.

At the present time the theory that the atoms consist of a very small nucleus and an outer atmosphere of negative electrons is dominant. Atoms are sometimes pictured as miniature solar systems. One of the strongest reasons for holding this view is the work of Rutherford and his co-laborers upon the bombardment of the atoms by high speed electrons. Only a few of these electrons are deflected from their path and the number is so small that it shows that the volume of the deflecting nucleus must be very minute. The diameter of the atom is about ten to the minus eight power centimeters and the volume of the nucleus is considered as being much less than a ten trillionth of the size of the atom. Through most of this region it is assumed that the electron is subject to the inverse square law of force that applies to the macroscopic world. These experiments hold, however, only for very high speed electrons. There is evidence that some of the atoms are broken to pieces by this bombardment so that here is a condition of artificial atomic disintegration. Natural disintegration or radioactivity applies only to the ordinary atoms of uranium, thorium, actinium and perhaps potassium and rubidium. So far as our direct laboratory experience extends the other atoms are invariant as to their structure. Even many of the radioactive atoms have a long life, the average life of the uranium atom being about a billion years. (70),

THE EXTREME PERMANENCE OF THE MATTER ATOMS MAKES THEM VERY VALUABLE FORMS OF LABORATORY APPARATUS AND THE FUTURE MAY SEE THE SELECTION OF ATOMIC STRUCTURES FOR STANDARDS. THEY WOULD BECOME PART OF OUR COMMON SCIENTIFIC LANGUAGE. SUCH A SYSTEM WOULD HAVE A MATHEMATICAL AND PHILOSOPHICAL SIGNIFICANCE THAT IS VERY DIFFERENT FROM THAT OF THE MACROSCOPIC MECHANICAL WORLD. THE FREQUENCIES OF THESE SYSTEMS DEFINE CHARACTERISTIC NUMBER SYSTEMS. THE RELATIONS BETWEEN THE ATOMIC STRUCTURES DEFINE FUNDAMENTAL AND NATURAL FUNCTIONS. The existence of a number of forms (istopes) for the same atom make this system of standards somewhat more complicated.

The phenomena of radioactivity show that the atoms disintegrate through a series of forms and that there are isotopes or atomic forms (there are three isotopes of thallium and six of lead) that possess the same chemical and physical properties and yet differ in their atomic weight! The atoms are also shown to contain, apparently within their nucleus, alpha or helium particles and the beta particles or negative electrons. These particles are emitted with such a great velocity and their emission is accompanied by the emission of such hard gamma rays that their source must contain energy in a very concentrated form. The nucleus of the uranium atom is usually assumed to contain the stores of energy that are set free on the disintegration of this atom into the series that contains radium. There are 92 atomic numbers and these are related so that they can be placed in eight groups, the members of each family group possessing analogous chemical and physical properties. Of the 92 possible atomic numbers 89 places have been found filled by 119 kinds of atoms and isotopes. The chemists have considered the atomic weight as the distinctive property of an atom. The study of the hardness or the wave length of the X rays, emitted by different atoms when they are bombarded by rapidly moving electrons, was expressed by Moseley by the law that the order of the X ray frequency gives the order and the number of the atom in the table of the atomic families. The atomic number, as running from one to ninety-two, gives the charge of the nucleus of the atom according to Rutherford. This number would therefore give the number of the electrons in the atom. The positive charge of the nucleus is balanced by the negative charge of the electrons, part of which lies in the outer regions of the atom and determines its chemical properties. It would seem that if the positive nucleus is to contain the beta and alpha particles then

these particles must be much smaller than the electron is usually assumed to be if the nucleus of the atom is as small as Rutherford intimates. The outer electrons give the chemical properties and the electrical conductivity of the atoms. These are the valency electrons. The maximum number of electrons that are stable on the outer parts of atoms determines the families of atoms to be eight. This number of electrons is indicated to be eight in one configuration and eighteen in another. These outer electrons give the ordinary spectra and the outer structure of the atom and determine the Zeeman and the Stark effects. This is the region of hundreds of thousands of different frequencies of the order of $(10)^{15}$ power frequencies per second. The maximum density of the different frequencies is probably somewhere in the visible spectrum. The inner electrons are effected only by X and Gamma rays or rapidly moving electrons and alpha particles.

The theory of the atom is now in its initial state. J. J. Thomson proposed the view that electrons follow orbits that are located in a sphere of uniform electrification, a skeleton framework, and this model of the atom has been treated mathematically and illustrated by models in which parts, such as magnets, are held by central forces. The Thomson atom was the first to "explain" the family relationships of the atoms. In the Rutherford Bohr atom the electrons revolve in circular orbits about the nucleus. The angular momentum of all the electrons in an atom is the same. During the stationary states of the motion of the electron no energy is absorbed or emitted. When an electron passes from one orbit or stationary state to another, energy is absorbed or emitted. In this way Bohr accounts for the Rydberg and Ritz laws of spectra frequencies. The law of Moseley also follows from this type of atom. The arangement of the outer electrons, as indicated in the Bohr atom (forming rings), with the number of electrons in each ring, is given by the following numbers:

| | | |
|---|---|---|
| Hydrogen .....1 | Neon .....82 | Argon .....882 |
| Helium .....2 | Sodium .....821 | Potassium .....8821 |
| Lithium .....21 | Magnesium ....822 | Calcium .....8822 |
| Bisthmuth .....22 | Aluminium .....823 | Scandium .....8823 |
| Boron .....23 | Silicon .....823 | Titanium .....8843 |
| Carbon .....24 | Phosphorus ....843 | Vanadium .....8843 |
| Nitrogen .....42 | Sulphur .....8422 | Chromium .....88422 |
| Oxygen .....422 | Chlorine .....8441 | Mangauese .....88441 |
| Fluorine .....441 | | |

The inner rings always contain the smaller number of electrons.

The usual method employed to picture the atom is to view the positive nucleus as constantly exerting a force upon each of the outer electrons. At times the angular momentum is given an "atomic" character. It may be that a circular orbit

in the ether is as characteristic of this medium about a positive nucleus as is a " straight line " motion in the free ether. The orbits of the electrons in an atom may be elliptical as well as circular. By assuming elliptical orbits Sommerfield (Ann. d. Phys., 51, p. 125, 1916) accounts for the many multiple spectrum lines of hydrogen and helium. Korn (Phys. Zeit., Nov. 1, 1919) has assumed that the distance of an electron from a nucleus is a constant plus one or more terms which involve cosine terms with the oscillation periods of their line spectra. Sommerfeld explains the doublets of the X ray lines by assuming the orbits of the electrons to be either circles or ellipses of a definite eccentricity.

Ritz (see New Science) assumed the nucleus of the atom to be magnetic and made the force acting upon the outer electrons to depend upon their velocity rather than their position. Parsons has assumed the electron itself to be magnetic and the atom theories of Lewis and Langmuir tacitly assume some such an electron as this.

The atom model of Bohr is largely a spectroscopic one. The chemists have many properties to explain such as the asymmetric carbon atom and stereometric hindrance that appears to lead to the assumption of a static condition of the valency electrons. The static model of the atom requires the assumption of forces to replace the centrifugal force of a dynamical system of the type of Bohr. The static atom of Lewis and Langmuir starts with the assumption that the electron is a rotating ring of negative electricity and is therefore a small magnet. The electron is a magneton as well as an electrical body. The idea that the atom contains shells is equivalent to the assumption that the force exerted upon the electron is alternately an attraction and a repulsion. The radii that bind these regions of attraction and repulsion are positions of equilibrium and permit of the positing of an electron in a steady state. (71) THE NUMBER OF THESE STEADY STATES IS VERY GREAT WHEN IT IS CONSIDERED THAT THE SPECTRA OF BODIES IS EXTREMELY COMPLEX. IT IS EVIDENT THAT THE STRUCTURE OF ATOMS MUST BE VERY COMPLEX AND THIS IS EQUIVALENT TO ASSUMING THAT THE " ETHER " ITSELF MUST ACCOUNT FOR MUCH OF THE ATOMIC STRUCTURE IN THAT OUR PRESENT CONCEPTION OF THE ATOM IS THAT ITS VOLUME IS VERY SPARSELY FILLED WITH THE ELECTRICAL PARTS. The problem of two or more electrical parts within the atom is even more complex than that of two or more bodies in astronomy and it is for the supposed simplicity of the hydrogen atom, one electron and one positive nucleus, that the theory of the model atom has achieved its

present success. The problem of the ninety-two atoms provides one of the greatest problems for the new laboratory and the new mathematics. Classic theory takes on a Medieval and mythological atmosphere. Undoubtedly atomic structures will be found to be related to the quanta of energy. J. J. Thomson (Philosophical Magazine, April, 1919) has calculated a fundamental "distance" (which may be related to the doublet of electrons on the polar axis of the helium atom and which appears to be a part of every atom above hydrogen) which enters his equations of the atom, that is $3.6(10)^{-18}$ power cms. Thomson surmises that the Sodium D lines may consist of as many as 4,000,000 wave lengths and the L X rays, 660 wave lengths. The energy partitioning required in the emission, transmission and the resonating absorption of Sodium light by the atoms of the Magellanic clouds and of a Bunsen burner in our laboratory is very complicated indeed. Dempster (Physical Review, p. 139, Feb., 1920) estimates the life of a radiating hydrogen atom to be of the order of a hundred millionth of a second. During this interval about fifteen meters and thirty trillions of vibrations are emitted.

The study of the X ray diffraction patterns of crystals and metals has led to a much more extensive knowledge of the arrangement of the atoms in these bodies. The ductility of aluminum, nickel, cobalt, copper, silver, platinum and gold is due to their atoms taking a face centered cubic position. Hard spheres when shaken and pressed take one of two alternate arrangements which is known as cubic close packing. The above metals exhibit atoms in one of these arrangements while iron, tungsten, chromium, molybdenum and the alkali metals exhibit the other arrangement. Apparently these atoms are not exactly spheres or are subject to special forces of attraction localized at certain cube corners. The third arrangement of metal atoms is the hexagonal close packed type, an atom at each corner, one in the center of each cross section and three symmetrically placed within the hexagon (magnesium, zinc, cadmium and electrlytic cobalt. The atoms of the diamond, silicon and ammonium chloride arrange themselves upon the corners of squares. These atoms possess a cubic form.

(1) Present day theories of the atom assume that the positive charge on the nucleus is equal in magnitude to the charge of the non-nuclear or planetary electrons. Nearly all the mass of the atom is that of the nucleus. The mass of the complex atoms is usually assumed to be that of its constituent parts when they exist separately. As the electron mass varies with its velocity the above assumption is only approximate. The possibility of isotopic forms of the constituent atoms also introduces many possible structures for the heavier atoms. The

loss of energy mass in the disintegration of uranium into lead (8 alpha and 6 beta particles) appears to be only 0.052 of a unit of atomic weight.

(2) Harkins assumes that the even numbered atoms between 2 and 26 contain alpha particles or alpha particles and electrons as their nuclei. The atoms with the odd atomic numbers are assumed to contain hydrogen nuclei as well as alpha particle nuclei. The helium atom nucleus or the alpha particle is assumed to contain 4 hydrogen nuclei and 2 electrons. This would mean that there is only one kind of positive electron and that this loses mass when combined into a helium atom.

The structure of the atoms is indicated by Harkins to be as follows; where the inner and the valency electrons are respectively indicated two terms in e and the nucleus is given in terms of helium, He, and hydrogen H. Helium, He, 2e, 6e; Beryllium, 2He H, 2e, 2e; Carbon, 3He, 2e, 4e; Oxygen, 4He, 2e, 6e; Neon, 5He, 10e; Magnesium, 6He, 10e 2e; Silicon, 7He, 10e, 4e; Sulphur, 8He, 10e, 6e; Argon, 10He, 18e; Calcium, 10He, 18e, 2e; Titanium, 12He, 18e, 4e; Chromium, 18He, 18e, 6e; Iron, 14He, 18e, 8e; Lithium, He 3H, 2e, e; Boron, 2He 3H, 2e, 3e; Nitrogen, 3He 2H, 2e, 5e; Fluorine, 4He 3H, 2e, 7e; Sodium, 5He 3H, 10e, 1e; Aluminium, 6He 3H, 10e, 3e; Phosphorus, 7He 3H, 10e, 5e; Chlorine, 8He, 3H, 10e, 7e; Potassium, 9He 3H, 10e, e; Scandium, 11He H, 18e, 3e; Vanadium, 12He 3H, 18e, 5e; Manganese, 13He 3H, 18e, 7e; Cobalt, 14He 3H, 18e, 9e. See Physical Review, February, 1920, for the structure of the heavier atoms and the nature of their disintegration.

(3) Lewis and Langmuir (Phy. Rev. April, 1919) have given the following structures for the outer electrons. The electrons are assumed to be stationary, to rotate or to oscillate about definite positions in the aom. In stable atoms, such as those of helium and argon, the electrons are assumed to be arranged in pairs placed symmetrically about an equatorial plane of the atom (with no electrons on that plane itself). An axis of symmetry normal to the equatorial plane symmetrically cuts four planes intersecting each other at right angles. This type of atom has the symmetry of the cube.

(4) In order to account for the spectra it is necessary to assume that the electrons are posited in a series of concentric shells of equal thickness and with mean radii forming a series, 1, 2, 3, 4, etc., with effective surfaces, 1, 4; 9, 16, etc.

(5) Each shell contains all spaces occupying equal areas of the shells and positioned according to the symmetry of the four secondary planes. The cells all have the same volume. The first shell contains 2 cells, the second shell 8 cells, the third 18 and the fourth 32.

(6) In the first shell the cell can contain only one electron. In the other cells there may be one or two electrons. The outside shell is the last to be filled. The outer cells of the inert gases have the same number of electrons. When each outer cell has two electrons there are two layers to the atom. Helium, neon, argon, krypton and xenon contain 1, 2, 3, 4 and 5 layers, respectively, and radium emanation, six. Helium has 2, neon 10, argon 18, krypton 36, xenon 54 and radium emanation 86 electrons. All the atoms beyond helium have 2 electrons in the first shell next to the nucleus. The line connecting these two electrons is called the polar axis of the atom.

(7) Two electrons in the same shell are mutually connected by very weak forces.

(8) When the number of electrons in the outside layer is small, the magnetic attraction of the inner electrons exceeds the electrotatic repulsion. The properties of the atoms are determined by the number and the arrangement of the electrons in the outside shell. From these postulates is devised the structure of the atoms. Hydrogen consists of one electron and one nucleus. Helium has two electrons on its polar axis. Lithium has a second shell with an electron on the one corner of a cube. The last atom in this series, neon, has eight electrons on the corners of the cube. Carbon has four corners of the cube filled.

In spite of the great degree of difference between the permanency of the atoms and the process of radioactivity as compared to the impermanency of molecules and the processes of ionization, the trend of the new chemistry is to consider the structure of the atoms as being essentially continuous with those of the molecules. Ionization, as detected in the laboratory, is only one of the almost infinitely numerous states of partial ionization as indicated by all the different steady states of the Bohr atom that are produced by the absorption and the emission of energy and by such effects as pressure, the Zeeman and the Stark phenomena. The various effects should depend upon the steady state of the electrons in the atom. The partitioning of the energy of motion to the parts of a finely structured atom requires that there be a means whereby this energy is carried so that the conditions of the absorption and the emission of energy in radiation by change of steady states is only one of the many energy changes that the atom parts experience.

The apparent continuity of molecular and atomic structures makes it evident that the vital processes, that are so evidently connected with molecular changes, are of necessity connected to the atomic structures that form the basis of all explanations of molecular phenomena. Present atomic theory necessarily carries vital phenomena into the permanency of the atomic structures.

(31) **Electrons.** In 1897 Crookes studied the properties of the cathode rays and found that they produce a phosphorescence, that they exert a mechanical pressure on impact, that they are deflected by a magnet and matter that they constitute. what Crookes called, a fourth state of matter, a condition where the parts are either negative electrons or positive nuclei. After the discovery of x rays by Roentgen in 1895, a new impetus was given to the study of the cathode rays and J. J. Thomson showed that they consist of rapidly moving negative electrons that are deflected by the electric and the magnetic fields. He devised a method of measuring the velocity and the charge and mass of the electrons by measuring the deflections caused by the force fields and the charge carried to a conductor. The phenomena of radioactivity, ionization ,the electrification produced at high temperatures, spectroscopy, and wireless has greatly extended our knowledge of the electron and its distribution. (72) ONE OF THE MOST IMPORTANT GENERALIZATIONS OF OUR KNOWLEDGE OF THE EXTERNAL WORLD IS THAT OF THE UNIVERSAL DISTRIBUTION OF NEGATIVE ELECTRONS IN ALL THE ATOMS OF MATTER AND THE INTIMATION THAT THERE IS ONLY ONE KIND OF POSITIVE ELECTRON.

The philosophy of a mechanical materialism applying to the common structure of the objective and the subjective worlds thus crumbles to dust, as have all the more ancient philosophies that looked for the fundamental substructure of things to consist of water, earth, fire, air, and the spirit that is the fleeting experience of certain aspects of coordination as exemplified by the human cell colonies. The parables, allegories and the personifications that are given by materialism therefore become relegated to mythology and possess only historical value. Neither language nor any of the other subjective phenomena can now be asserted to be functions of mechanical configurations as these are but the fleeting macroscopic and statistical functions of the finer electromagnetic world. Periodicities attain a new range when we can observe the periods of a few of the atoms to vary between a billion years to a minute. Time, as measured in thousands of years, or in the millions of years of the evolutionists, takes on but an evanescent character when we consider the possibilities of the evolution of the matter atoms, the electrons and the positive nuclei. However we may be accustomed to think of the touch, the pressure and the inertia of the mechanical world, we must confess that these are but the macroscopic integrations of the almost countless halo electric and magnetic fields of the electron world. Unless we feel the inner forces of the electrons and the positive nuclei in the subjective world we

must ever remain ignorant of this concentrated field of experience. But we cannot feel the macroscopic without feeling the microscopic.

So far as known, the velocity of the electron appears to be continuous so far as our observations go. If m is the mass of the electron at rest, C the velocity of light and mv the mass of the electron at some other velocity, then the following values give the increase of the mass of the electron as its velocity is increased towards that of light, assumed as unity. The increase of mass does not begin until the velocity is very great compared with our accustomed velocities. If all acceleration of the electron is accompanied with changes in mass then it follows that the structure of mass entities must be very small to account for the apparent continuous velocity increments of the electron. (73) MASS, IN THE ELECTROMAGNETIC WORLD, IS VARIANT OR ATOMIC AND APPEARS AS POSSESSING A VERY MINUTE STRUCTURE. IT APPEARS AS THE PROPERTY OF ENERGY QUANTA OR THE ENTITIES OF ELECTRO MAGNETIC RADIATION.

| C | mv/v | C | mv/v | C | mv/v | C | mv/v |
|---|---|---|---|---|---|---|---|
| .01 | 1.000 | .30 | 1.048 | .92 | 2.552 | .99 | 7.089 |
| .05 | 1.001 | .50 | 1.155 | .95 | 3.203 | .992 | 7.922 |
| .10 | 1.005 | .74 | 1.487 | .96 | 3.571 | .996 | 11.19 |
| .20 | 1.020 | .90 | 2.294 | .98 | 5.025 | .998 | 15.82 |

In the Newtonian philosophy it was assumed that inertia was a constant. If there is such an invariancy the "atoms" of inertia are very microscopic as compared with the charge of the electron. The magnitudes of electrical charges are measured and counted under static conditions and it is an exterpolation to assume that these are independent of the velocity. It is the function of philosophy to attack the general problem of the relation between the properties of entities and their velocity. In electromagnetism the force fields are absorbed by the matter atom centers. The experiments of Majorana, on the power of mercury screens to cut off the force of gravity, suggest absorption centers of gravitation. Force fields should be atomic and be related to "events," cycles, periodicities or time.

(32) **The Electromagnetic Field.** The electric fields about the positive nuclei and the negative electrons are pictured as being radial although theories have been proposed in which the assumption is made that a single line of force radiates from each of these centers. (74) WHEN A POSITIVE AND A NEGATIVE ELECTRON COMBINE SO AS TO BE ELECTRICALLY NEUTRAL THE EXTERNAL

ELECTRIC FIELD DISAPPEARS AND THE INTERNAL FIELD EXHIBITS POLAR PROPERTIES. POLAR PROPERTIES INDICATE CONDITIONS OF EQILIBRIA. In gases and liquids the polar properties of matter are macroscopically lost when billions of billions of atoms and molecules are studied because of the rotation of these parts or their changing orientation during collisions. In solids the polar properties may not be recognized for the reason the atoms and the molecules are not ordered but their previous history has left them in the random positions of a liquid. (75) THE ATOMIC PHILOSOPHY IS PRESENTED WITH THE DIFFICULTY THAT ANY ANALYSIS OF A POLAR EQUILIBRIUM REQUIRES THAT THE NEUTRALIZATION THAT IS ASSUMED IN THE EQUILIBRIUM IS UNLOOSED AND THIS RESULTS IN THE POSTULATION OF VERY INTENSE QUALITIES FOR THE ISOLATED ENTITIES. This applies to the subjective as well as the objective world. Macroscopic phenomena are therefore very "mild" compared to those of the microscopic world. The very abscence of polar effects in the macrosocopic world, as in the case of gravitation, is not necessarily a proof that they do not exist in the component structures of the given phenomena. It may be assumed that microscopic mental phenomena are likewise very intense and concentrated. The phenomena of radioactivity illustrate how concentrated microscopic phenomena may be. The conclusions to be drawn from the properties of polarization are that the electric and the magnetic fields are the seats of very intense "forces" and "states of polarization." The variation from loose to dense packing of entities, as we go down the atomic scale, may be employed as another reason for believing that the ether is very dense. The close association of the light velocity with the ether and the electromagnetic phenomena lead to the view that any structure entities of these may have this velocity just as the velocity of sound is related to the velocity of the gas molecules.

Hargraves has shown that the moving lines of electric force remain invariant during the transformations of the coördinates by the methods of relativity. As invariancy is often associated with the existence of entities it is natural to view these lines as being entities. Bateman has called these new entities protoelectricity and the singularities of this proto field are the electrons and the positive nuclei. By a process similar to that of differentiation the proto field is transformed into the electromagnetic field and electric charges at the ends of lines of force. The protoelectric charges flow along the lines of force with the velocity of light.

The possible existence of longitudinal electromagnetic waves with a velocity greater than that of light has been proposed to explain gravitation. The process of action at a distance has been considered as either instantaneous or gradual and the force fields have been employed to carry energy by undulations involving a complicated vibrating system of equilibria such as that of protoelectricity. The electric and the magnetic fields have been assumed as both kinetic: both potential: either one kinetic and the other potential: or one or both partly kinetic and partly potential. Whenever kinetic energy is assumed we must picture an ether atom as containing the energy.

The structure of the electromagnetic field will undoubtedly be found to be exceptionally characteristic and one that cannot be defined by the macroscopic forces, contacts and collisions of the mechanical world. The structures that account for the steady states of atoms, the partitioning of energy quanta and perhaps the thought process are phases of the problem of the electromagnetic field.

While Matter "pens" us "in,"
What's felt from sense has been
The Space Time atom din
By nerves to mind sent in.

Our mental world seems made as fine
As any motion on force line.
And these covariant align
To Relativity's design.

The struggle to survive in life
Makes all subconscious but the strife.
The fleeting fashions that we feel
Are simply earth's e'er changing reel
Of moving scenes. With these we deal,
Subconscious fashions longer last
For these are formed on lines more vast.
They are the cells of ancient Caste.
From other worlds they show descent
As onward through their course were sent
By ruling soul Invariant.

## XII. 33 THE ETHER

Ever since the time that it was shown that light could pass through a vacuum, and sound could not, it has been assumed that the so-called vacuum is a medium that carries light waves and may transmit gravitational, electric and magnetic forces. The older theories considered that the atoms of matter completely filled the portion of space that they occupied but present theory pictures the atoms as vast spaces that are less filled with the electrons and the positive nuclei than is astronomical space filled with stars. (76) THE UNIVERSAL THIRD, THE MEDIUM THAT CARRIES FLUX BETWEEN THE ISOLATED ENTITIES, THE ALL PERVADING EXTERNAL MEANS OF COMMUNICATION BETWEEN THE ELECTRONS (AND PERHAPS THE LIFE ENTITIES) IS THEREFORE THE ETHER. ITS STRUCTURE IS THAT OF THE INVISIBLE UNIVERSE "BECAUSE" IT IS THE MEANS OF VISIBILITY. The energy quanta traverse the ether with no (or at least only an infinitesimal) change or at least one that requires hundreds of thousands of years for its manifestation. (77) THE ETHER MEANS OF LANGUAGE IS THEREFORE IDEAL IN THAT IT IS INVARIANT. THE FACT THAT IT IS THE ETHER THAT RELATES ALL THE ATOMIC ENTITIES FROM THE STARS DOWN TO THE ELECTRONS MAY REQUIRE INVISIBLE ENTITIES OF THE ETHER TO PARALLEL THOSE OF THE ATOMIC SCALE.

The ether has been considered as a very dense and a very rare fluid, a solid, a gas, a jelly and a structure that is mechanically interconnected. Ether atoms have been pictured to carry light as matter atoms carry sound. Electricity has been called the heat of the ether and electrical potential the temperature of the ether. The electron is viewed as an aggregate of ether atoms and a very concentrated condensation of energy. One of the most important properties of the ether is the normal relation existing between the direction of action of motion of an electron and the direction of the electric and the magnetic fields of the point of observation. The mechanical analogue of the top pictures the ether as rotating between the electron and the magnetic pole that would be required to produce the resultant magnetic field.

The suggestion that the soul is a structure in the ether is sometimes intimated to mean very little because it is said that we know almost nothing about the ether. It is true that there is little positive knowledge of the ether. (78) THE IMPORTANT CONSIDERATION IS THAT THERE IS A GREAT DEAL OF NEGATIVE KNOWLEDGE OF THE ETHER AND THAT THIS POSSESSES GREAT VALUE WHEN ONE GOES TO THE LABORATORY WITH A PROGRAM. A CHARACTERISTIC PROPERTY OF THE ETHER IS THAT OF THE LIGHT VELOCITY (C). IF ALL STRUCTURES CONSIST OF PARTS, X, Y, Z, (ELECTRICAL) IN THE ETHER THEN ALL VELOCITIES MUST BE BETWEEN THESE PARTS AND BE THAT OF LIGHT. ALL KNOWN VELOCITIES ARE LESS THAN C AND MAY MEASURE THE ENTRAINMENT OF ENERGY AMONG THE ABOVE ULTIMATE PARTS. If matter is but a condensation of energy in the ether then all objective phenomena should be expressible as functions of e, e, energy and ether. If electrons (e) are independent entities then the functions will depend upon relations of a trinity of e's.

Our Atlas e'er defies,
Concepts our All "allies,"
Our every vision lies
"Unseen" from distant skies.

## XIII. 34. THE ULTIMATE UNITS AND THE PARTITIONING OF ENERGY.

Science speaks of kinetic, potential and radiant energy. Philosophy sometimes speaks of vital energy. Energy has invariably been measured in terms of the coördinates of time and space. This view is in accordance with our assumption that the basic units are those of the second, the centimeter and the gram. The collapse of Newtonian mechanics in the electron world has shown that this system of units cannot be ultimate.

The language or the flux of the objective world, and most probably of the subjective world too, consists of entities of energy. The other entities are hidden Containers or abodes and serve as the sources and the sinks of energy. The complexity of phenomena is therefore the complexity of the structures of energy. The Invariancies of the external entities are the Invariancies of their relations with energy. The idea of direction is essentially that of energy relations. All the knowledge of the soul of the objective world has been attributed to the quanta of energy that flow into it through the senses. The law of the conservation of energy is a necessary condition of conservation of the entities of the external world if there is to be any conservation at all. All change is accordingly the continual partitioning of energy. All collisions and relations are energy interchanges. The unities of the external world are to be attributed to the unities of certain quanta of energy. If then we are to assign such an exclusive role to energetics it follows that all the fundamental and basic characteristics of language and numbers must be found in energy structures. The ultimate entities must be quanta or the properties of energy quanta. (79) THE LABORATORY EXPERIENCE OF THE OBJECTIVE WORLD SUPPORTS THE VIEW THAT ANY ONE FORM OF ENERGY CAN BE CONVERTED INTO ANY OTHER FORM AND THAT THEREFORE THE ULTIMATE QUANTA OF ENERGY ARE ALL IDENTICAL. THE MICROSCOPIC FORM OF THE LAW OF THE CONSERVATION OF ENERGY WOULD ALSO ASSERT THAT THE DIRECTIONAL PROPERTIES OF ENERGY ARE CONSERVED AS WELL AS ITS SCALAR MAGNITUDE. ENERGY QUANTA FORM A PERMANENT SERIES OF FAMILIES DETERMINING THE MATTER

ATOMS. THE CHARACTERISTIC PROPERTY OF FREE ENERGY IS THAT OF THE LIGHT VELOCITY. THE STRUCTURE OF ENERGY WAS DESCRIBED BY PLANCK IN 1901 BY HIS LAW THAT THE SIZE OF A QUANTUM OF ENERGY IS EQUAL TO A UNIVERSAL CONSTANT H TIMES THE (N) FREQUENCY OF THE RADIATION THAT EMITTED THE QUANTUM The Problems of energy frequencies contain all the complexities of spectra, of the Zeeman and the Stark effects, the polarization of radiations, radioactivity, the problems of rotation and acceleration, the Einstein light effects and the possible nature of the electrical charges (if these are to be viewed as condensations of energy).

(80) THE ATOMIC THEORY OF MATTER AND OF ELECTRICITY HAS REDUCED ALL THESE ENTITIES TO COMBINATIONS OF NEGATIVE ELECTRONS AND POSITIVE NUCLEI. THIS MEANS THAT ALL PARTITIONING OF ENERGY TAKES PLACE BETWEEN TWO TYPES OF "CONTAINERS" WHICH WE WILL ASSUME ARE REPRESENTED IN THE SUBJECTIVE WORLD AS WELL AS IN THE OBJECTIVE WORLD. KNOWLEDGE IS THEN A MATTER OF RESONANCE BETWEEN THE INNER AND THE OUTER CONTAINERS OF ENERGY. OUR PERFECT UNDERSTANDING OR FEELING OF THE WORLD REQUIRES THAT ALL POSSIBLE PROCESSES OF MICROSCOPIC ENERGY PARTITIONING MUST TRAVERSE THE AVENUES OF THE SOUL. THIS CONDITION PROVIDES THE BASIS OF A UNIVERSAL LANGUAGE AND UNDERSTANDING OF ALL PHENOMENA. ENERGY AND ITS CONTAINERS PROVIDE THE ULTIMATE UNITS AND THE MATHEMATICAL PROCESSES AND PRINCIPLES FOR THE DESCRIPTION OF ALL OBJECTIVE PHENOMENA. The partitioning of energy is very complex in that so far as our laboratory experience goes the motion of the electron is continuous from zero to that of light and in an infinite number of different directions. Angular momentum entities, discontinous velocity and acceleration increments and the possibility of energy quanta themselves possessing inertia and therefore requiring energy for acceleration are problems for future research work. The inertia of the electron does increase with its velocity.

The application of the law of Planck has met with much questioning. Let us consider that an electron has been ejected from an atom through the absorption of E units of energy of radiation or the absorption of the potential energy of the electric field. The kinetic energy of the electron may be the

photoelectric quantum HN. The absorbed energy in the atom, E-HN, might not be described by the law of Planck. The quanta of energy appear closely associated with "characteristic" or "flourescent" radiation and with the kinetic energy of the photo-electrons but not with "scattered" and absorbed potential forms of energy.

There is some laboratory evidence, like that of the work of Gans and Viguez upon the refraction of light by crystals, that supports the view that the ultimate quantum of energy (R) is less than ten to the minus fortieth power ergs. All quanta of energy would then be integral multiples of this ultimate quantum. (81) THE SERIES OF ENERGY QUANTA DEFINE THE ULTIMATE SERIES OF NUMBERS. R IS ONE OF THE ULTIMATE UNITS. THE CONTAINERS OF ENERGY ARE THE ETHER ATOMS AND THESE WILL BE CALLED THE X ENTITIES. RADIANT ENERGY CONSISTS OF QUANTA OF ENERGY PASSED TO AND FRO BETWEEN THE ETHER ATOMS. CERTAIN POLARIZATION STRUCTURES OF THE ETHER ATOMS FORM THE ELECTRONS AND THE VITAL ENTITIES. THE STRUCTURES OF THE LIFE ENTITIES ARE AS FINE GRAINED, COMPARED TO THE ELECTRON, AS ARE THE FORCE FIELDS (E) OF THE ELECTRONS COMPARED TO THE ELECTRONS THEMSELVES. THE FREQUENCY ASSOCIATED WITH R IN THE ETHER FORCE FIELDS IS N. ALL THE FUNDAMENTAL RELATIONS OF THE MICROSCOPIC WORLD MAY BE LINEAR SO THAT THE PHILOSOPHY OF COUNTING AND INTEGERS IS APPLICABLE. THE SOUL IS REPRESENTED BY Z. THE FUNDAMENTAL RELATIONS OF R, N, E, X AND Z ARE TO DEFINE THE LIMITS OF THE FREEDOM OF THE CYCLONIC PHENOMENA OF LIFE AND THE UNITS R, N AND E ARE TO BE THE BASIS OF ALL OBJECTIVE METRIC KNOWLEDGE. THE METHODS OF OPERATION OF Z ON THE R ENTITIES CONSTITUTE THE A PRIORI POWERS OF THE LIFE ENTITIES AND ARE TO BE DESCRIBED BY THE LAW OF THE ENTROPY IMPERATIVE. THE MORE MACROSCOPIC LAW IN THE OBJECTIVE WORLD IS THAT OF ENTROPHY AND PERCHANCE RADIOACTIVITY. The words of the new language are those of the energy quanta as they are conveyed by the nerves to and fro between the senses and the brain. Time receives its definition from the frequencies of the energy quanta while space is a much more macroscopic conception. Conscious feelings and willings are basic in that they represent the soul as absorbing and emitting

energy. (82) THE CONDENSATION OF ETHER OR ENERGY IN THE ELECTRONS AND THE POSITIVE NUCLEI MAY MEASURE THE ENTRAINMENT THAT ENERGY QUANTA EXPERIENCE COMPARED TO THEIR TRANSMISSION IN THE FREE ETHER. This problem of energy entrainment is very complex since it depends greatly upon the frequency. Potential energy and the ease of change between certain forms of kinetic and potential energy are equally serious. (83) CONSCIOUSNESS AND "VITAL" FORCE ARE PICTURED AS THE POWER TO IDENTIFY THE ENERGY QUANTA AND TO DIRECT THE PARTITIONING OF ENERGY. Energy flux appears as a necessary condition before the power of consciousness can act. The soul is the Container of the Methodology of Consciousness of Energy. Unconsciousness results when its Power lapses due to the external flux of energy being cut off by the "automatic" or subconscious (cell) activities. The idea of length may be given by a sort of Morse coding of the energy quanta as they stream into the soul. If this "coding" is "squared" we get the "idea" of "surface" and if it is "cubed," "space." The "coding" is related to the nature of the changes in the steady States of related electrons. The family of matter atoms and their relations are "known" by the family of energy quanta and their interconnections. Energy directed positively and negatively along some world lines may eventually combine into matter.

1. At ordinary commercial prices of energy a pound of light would cost half a billion dollars. The earth gets 160 tons of light daily from the sun. There are 6 times 10 to the 55th power atoms in the solar system. One atom per 10 c. c.

2. The source of the heat of the sun and the planets has been attributed to the gravitation which they absorb (Majorana). Assuming the positive nucleus to be of the assigned size of the electron it would be ten million million times as dense.

3. The charge on a milliagram of hydrogen ions would raise the potential of the earth to 100,000 volts.

4. A steel gun would burst long before enough of hydrogen ions could be pumped into it to show the spectrum of hydrogen.

5. To ask "where" the soul "goes" after death is to make the soul an atom. May not the question be as irrelevant as to ask, where is space or where does time go? What meaning has the motion of a point, a line or a plane? Are not these merely gross parables of grammar, exterpolations made in the skeleton of language by unwittingly using words like "go" and "move" universally? Many a mathematician and

scientist has questioned the story of Genesis and never noted the "basic" mythology of his own branch of learning.

6. The difference between man and the animals is that no matter how low a man or woman falls they still feel their own "smartness" and self righteousness. Were it not for luck or fate all would be different. No matter how heinous may be the acts of a man he nevertheless judges the most lofty acts of the Saints. Nations can concentrate their energies in the hate of war only to become dissolute in the blessings and ideals of peace.

In and Out, High and Low,
Make Magic's Shadow Show,
All Fix'd Directions go
While Phantom Structures flow.

To "measure," in number
Makes science a wonder,
But figure's a blunder
Fray's wisdom asunder.

For any "relation"
Seek enumeration
Our atomization
Without is negation.

## XIV. THE OLDER AND THE NEW PHILOSOPHIES

In the struggle for existence and the growing of families, the attention of men is so thoroughly given to the means and the might that will provide the satisfaction to the internal urge for food, clothing, shelter and the longing to multiply, that he ceases to be higher than the animals excepting in the technique of accomplishing more fully the same purposes that they succeed in doing. A few divine souls rise above the necessities involved in the continual daily combat and are urged by higher aims to investigate this condition into which man has fallen and to lift him beyond the morass of the animal plane if possible. Unfortunately Men like Socrates and Christ do not hand down their philosophy through their children and, more unfortunately, they find it hard to get men and especially women, to see and live their visions. The Stone Age philosophies change their names but continue to abide with the fundamentally ignorant, selfish, backward and superficially cultured people of our own day, frequently among the majorities and especially in those mob and crowd philosophies that sweep the minds of men like fevers and pestilences wreck our bodies. (84) THE NEW PHILOSOPHY AIMS TO ERADICATE ALL THESE ANCIENT AND HEATHEN PHILOSOPHIES OF SUPERSTITION AND ANIMALISM AS SEEN FROM WITHOUT. IT AIMS TO PREVENT THE CONTAMINATION AND SATURATION OF IDEALISM WITH BARBARIANISM AS IT FILTERS FROM THE ANIMAL WALKS OF LIFE. IT AIMS TO SHIFT ALL THE EQUILIBRIA, UPON WHICH OUR COMPLEX CIVILIZATION RESTS, TO A HIGHER PLANE. Warfare will not cease when the nations beat their swords into pruning hooks. No fiercer and more cruel warfare can be carried on than that between the classes, the races, business and intellectual specialists, the devotees of fashion and the moral law; the cringing and pampering weak churchmen or the savants of a despotically ruled university. Knowledge does not itself raise men above the animals. Technique may but serve to perfect some Mephistopheles. Bigness, even of the numbers of men, means nothing.

The civilized consciousness (and its memory in history) of men arose in the plains of the Nile and of Mesopotamia. Here shine out the Galaxy of language, letters, numbers, li-

braries, temples, pyramids, ships, laws, literatures, logic, mathematics, religion, art, sculpture, government, astronomy and philosophy. Wonderful and valuable as were all these advances they were but means to ends. Unless integrated to an end they were but the confusion of tongues to a people that aimed to rise to heaven on their towers of Babel in the plains. No earthen environmental Natural Selection Tower of Babel will ever carry men to the celestial regions. Modern technique is just as important as were the bricks in that ancient Tower in the Mesopotamian Plains.

The greatest revelation of all time came in the teachings of Christ. The food, raiment, shelter and animal imperatives must be placed in the subconscious as much as possible. The carefully nurtured Inner Willings furnish an Absolute Direction by means of which we can " compass " the imperatives of life. Eons before a similar system had been ushered into operation by the Fraternal Cell Colony Democracies of the individual plants and animals. Eons before, a Moses Cell had thundered down from some high Sinai, " Cell, Thou Shalt not Kill." Then was a Curse pronounced upon the Cain Cells, the Curse that we call Cancer or enemy Bacteria, and a Blessing bestowed upon the Abel Cells. Then were the Serpent Toxic Cells driven from the Body Garden of Eden. Ever since have these same enemies encompassed us in our Gardens of Gethsemene to carry us to the Tomb of Death upon Crosses of Toxic Suffering.

Somehow man has come into the state of consciousness of his present physiological mechanical world. His entropy imperative has directed his life to this condition where memory appears. When we consider the destruction and the pain of life it may be difficult to feel that this entropy has operated according to any principle of a minimum path to a clearly discerned goal. Yet we can as readily see that time is itself a macroscopic and dependent variable so that the very idea of an entropy in its most general significance is at present altogether macroscopic and has been taken from our mechanical and electromagnetic worlds. (85) THE ENTROPY SYSTEM OF LIFE THEREFORE DOES NOT CONTAIN MACROSCOPIC TIME AND SPACE. IT IS APPARENT THAT THE IMMEDIATE PROBLEM OF MAN IS THAT OF EXPRESSING THE MEMBER TERMS OF THE ENTROPY INTEGRAL AND EVALUATING THESE TERMS AS CONSISTENTLY AND AS ABSOLUTELY AS WE CAN. MAN WILL NOT COME TO HIS FULL ESTATE UNTIL HE KNOWS AND OPERATES THE COMPLETE DIRECTION OF HIS ENTROPY IN HIS INDIVIDUAL SELF, HIS GENES CELLS AND IN HIS SOCIAL RELATIONS. The New Birth, the Personification of Child Life, the Love of Wisdom, the eugenical command

that "the Meek (by Wisdom) Shall Inherit the Earth," a complete control of our microscopic equilibria within, the utilization of a common soul language, the understanding and the control of those entropy terms that represent old age, habit, ennui, death and communion with those life entities that have not taken on the human form (and those that have cast it off) are a few of the little known terms of the entropy series. Christianity represents the great step that mankind has made in the direction of the inner life entropy imperative.

For thousands of years the problems of an animal life and the eventual decadence of the "superior" classes has periodically eclipsed the visions of the seers of men. Even for centuries after the Sermon on the Mount, the lethargy of the Middle Ages, the Selfish Might of Feudalism and the ancient philosophies of the Stone Ages stood staunchly under the veneer of a superficial and ritualistic Christianity. Then came the sunrise: the New Learning: the Reformation: the astronomy of Corpernicus: the Laboratory system of Bacon: the Round World and the New Hemisphere of Columbus: the Printing Press: the Compass: Gunpowder: and the Mechanical Science of Kepler, Galileo and Newton. As the belief of Immortality transformed the cattle herders of the Nile into Great Pyramid Builders in a century and a half so the belief in a Christian Imperative and Freedom in life has wrought wonders even though it is lived by only a few. But the New Learning gradually subsided into a materialistic philosophy that is illustrated by the mechanical basis of our system of units and the development of biological evolution. This is the common philosophy of the unthinking layman specialist. The very dawn of democracy among the lower classes at the same time diluted ideals with the superficiality and the atmosphere of the brute struggle for existence that dominates the philosophies of uncultured man. The new idols of the times changed from the images of gods to the means that invention and discovery had meant to be but the subconsciously ordered automatic slaves of man. The means that had been devised for the uplift of man to a higher plane of thought were used for the degradation of the spiritual man. A Militarism became prevalent that blighted what, with Christianity, would have been the profoundest blessing. Competition and the adoption of a feudal system in business and the University became a more virulent plague than many of the organizations of Medieval and Ancient Times. Invention and mechanical science has prospered mightily. Christianity, as the provider of food and the material comforts of life, has greatly reduced the poverty of the body. But a corresponding advance in the spiritual domain, for which material prosperity is but the means, is at least open to question.

The new age and the new philosophy have come gradually. We see it in Kant and in the grossly fabulous forms of Schelling, Fichte and Hegel. In a more proper spirit it appears in the revolutionary work of the new geometries of Lobachewski, Bolyai, Gauss, Riemann, Klein, Hilbert and others. (86) IT IS IN THE NEW ATOMIC SCIENCE THAT ONE OF THE GREATEST REVOLUTIONS HAS BEEN MADE. Thermodynamics and the electromagnetic theory of Maxwell opened the way to the discovery of the electron, the ether waves (beyond the domain of light) and radioactivity. As evolution dissolved away many of the Allegorical Dreams of the Ancients so the new physics and the new chemistry shows us all how superficial are the glimpses of evolution that we have so far seen. Haeckel and Spencer missed those inner Urges of life that were revealed to many a Seer of the ancient past who read their messages from the strivings of the life entities rather than as embalmed and dead mummies in the rocks or a form under the microscope. The permeation of this philosophy amongst the specialists has aroused a new spirit. The Great War has proven how utterly man was bound by the old philosophies of the Stone Ages and how superficial was the smattering of the new light. (87) THE AIM OF THE NEW PHILOSOPHY IS TO SPREAD AND HOLD THE HEARTS OF MAN. IT AIMS TO MINIFY THE REVERSION THAT IS OTHERWISE SURE TO FOLLOW AFTER ANY GREAT REVIVAL. EUGENICS APPEARS AS PART OF THE NEW PROGRAM. ALL FATHERS AND MOTHERS SHOULD BE PH. DS. OF THE VITAL ENTROPY PHILOSOPHY. Materialism is only a part of phenomena for the perception of which the life imperative has been millions of years perfecting the sense organs and the consciousness that has so completely mastered the most of us. The ministry of Christ was to redeem us from this slavery. The economics, the morals and the eugenics of our own cells in their cell colony democracies is a constant revelation to us of the divinity of the Message of Christ and his harmony with the great (and as yet but partly expressed) Entropy System of Life. (88) ALL THE OLDER PHILOSOPHIES HAVE STOPPED WITH THE CRUDE, MECHANICAL AND MACROSCOPIC LANGUAGE OF MANUAL AND BODILY SIGNS, GRUNTS AND THE MORE POLISHED SYSTEMS OF PHONETIC TONGUES. Even men like Kant do not see that the a priori content and power of the soul is to be found in the microscopic world of the soul, the Kingdom of Heaven that is within. Even Kant, Fichte and Hegel worshipped their own manufactured macroscopic gods and failed to see that what is Abiding and Immortal is "Within" and Micro-

scopic. Beyond the Cell Democracies lie the Republics of the molecular, the atom, the electron, the energy quanta and the spirit worlds.

It results that all of our language applies only to this narrow region of the ear, muscle, taste, touch, smell and naked sight world. Even the categories of Kant are but the Exterpolations of the Traditions of an inadequate philosophy. Space, Time, Lengths, Points, Instants, Force, Matter, Power, Activity, Action, Impact and Contact are just as much Allegories as the ones that other philosophies had maintained Creation, Cause and Effect, Annihilation, God, Devil, Sin, Phlogiston, Design, Moral Law, Miracle, the Sun, Demons, the Moon, Light, Darkness and Revelations to be.

The New Philosophy is in its birth struggles. With all the revelations of the past it is in full accord. With Christ it turns from the outside and looks within. Only here can the Harmony of a new Kingdom come. From here arise the New Program and the Vital Purposes to mold the Future. The new language is to be that of the soul. Civilization is to be guided by the Visions of the Seers. Its immediate program is to discover a laboratory nerve language and a laboratory brain language and to build a metric science upon this language. In the meantime it is erecting an electromagnetic philosophy for the objective world to replace the mechanical philosophy of Newton, this latter being a chapter of the former.

The New Philosophy asks how an observing soul would experience and describe phenomena if it rode on the sun beams of the morning: if it abided in the deep recesses of the electrons and the matter atoms: if it slept for millions of years with the energy quanta embalmed in the fossil leaves of a fern plant in a coal bed: if it was agitated by the fiery collisions of the atoms of the sun: if it was torn by those holocausts of evolution that dissociate the radioactive atoms: if it watched the star streams of the Milky Way write the history of the universe: if it accompanied a quantum of energy bounding " down " through the light lanes of space, swirling through the curves in the riffles of the gravity fields and into the whirlpools of molecular and atomic change caused by the condensation of a nebula into the thermodynamic melting pots of suns and planets: if it experienced the powers that harmonized the star clusters and determined that Infinite Partitioning of Energy among these Entity Hosts: if it toured the World Lines of a four or higher numbered space; if it was agitated by the " manufacture " of ideas in the mind of a Newton: if it felt the tug of entropy directing the thermal and force field flux of the universe: if it dreamily followed the absolute imperative of life constantly struggling with its arti-

ficial equilibria that it set up as buffer conditions against the constant encroachment of a heartless environment in its wild sweep to universal dominion: and if it communed with that Supreme Soul that hurled the Fiat of the Life Imperatives against the Environment and whispered faith and hope in the mind of man, revealing to him his Freedom to establish within a Kingdom from which he could rule the Equilibria, inspiring him with an intense longing for all of the Higher Hormones and ever filling his youth with that tireless activity and curiosity to recognize and comprehend the Realm of the Kingdoms. The New Philosophy is the system of all Observers, Designers and their Laboratories and accumulated Languages and Wisdom. The New Philosophy assumes that this system is an absolute, unique and a consistent and harmonious whole. The New Philosophy is a philosophy of entities, of equilibria and their principles. It aims to control and direct these equilibria. It marshalls an infinite host of ordered observers and their laboratories in the Grand Imperative to Wisdom. It is the Baconian experimental method and Christianity developed to their Fullness.

The Relativity Principle pictures all our World Lines to be "free" between their Point-Events of Coincidence and that their apparent twisting in space is due to the "curvature" of space and time. We might attribute a similar curvature to the moral world and assign our apparent departure from idealism to be due to this "curvature." As our years go on this "curvature" increases. God would then be a "flat" moral world.

## XV. MATHEMATICS, THE GEOMETRIES AND THE RELATIVITY THEORY

The science of numbers and geometry is at present founded upon the metric system of the Newtonian mechanics and the macroscopic phenomena of the senses. These subjects originated in the barter and the business of the Egyptian and the Greek worlds and in recent times their most microscopic application has been by the rulers, compasses and the apparatus of the mechanical world, in which length, time and mass were considered as the ultimate entities measured in terms of hypothetical Points, Instants and Particles, by the methods of an Exterpolated philosophy. The New Philosophy proposes an entirely new set of ultimate units and therefore makes time, length and mass macroscopic properties dependent upon aggregates of the ultimate entities. The Exterpolations of mathematics and geometry are to be just as much reduced as are those of our present metric physics and chemistry.

The origin of numbers can be allegorically pictured as taking place when consciousness first distinguishes between the soul or ego and that which is not soul. These are two parts and we here have a number series. In a similar manner the origin of relativity arises with that of number. Memory comes long after this hypotheticated primeval state and consciousness becomes filled with parts and all kinds of artificial number series arise from the relations manipulated by the soul. Negative, fractional, complex and irrational numbers are defined as mathematics advances. The artificiality of our own number system is indicated when it is considered that the first recorded use of zero appears to be in India as late as 867 A. D. It is natural to ask the nature of the number series and the permissible operations for the ultimate entities. In the description of these entities we use the mental operations and the necessary laboratory apparatus required to indicate identities and non-identiiets. Matter is now posulated to consist of negative electrons and positive nuclei. Here are two series of positive integer numbers. Fractional, negative, complex and irrational numbers here possess no meaning excepting as they express the flux and operation processes of these entities. Mental operations upon these series of numbers are simply the carrying of the old traditions of the ancient operations that we were taught in the schools and in the macroscopic walks of life. The assertion that two and two makes

four is fiction and a mental operation. For the above numbers two electrons and two positive nuclei may make a helium atom. As to the actual electrons it is necessary that we use marks in the identifying of Different electrons so that two and two electrons does mean four electrons. In the same way the counting of the electrons and the memory of the mental order one, two, etc., involves the markings of the mental entities that parallel the physical electrons. There are therefore mental and physical Approximations and the employment of Marks or Differences for each of these series.

The world Allegory that is employed in the terms Negative electrons and Positive nuclei would lead us to the result that Positives and Negatives Combined as they do in the theoretical number systems, leaving no residues. The Allegory might be held to prophecy that any kind of Combinations would be possible between the entities of the two series. This is not the case. Negative electrons and a Positive Nucleus Combine to form Matter atoms. The whole visible material universe results from the Combinations that take place between the entities of these two series. Naturally pure mathematics would vision an infinite number of these Different Combinations. The law of Moseley and the experimental work on x rays describes the Combinations as consisting of a series of atoms represented by the numbers from one to ninety-two inclusive, apparently no more and no less. This series is the Unique series of Matter Atom Entities. These Combinations, as regards their external properties, are remarkable for the perfect Equilibria of distribution between the Positive and the Negative parts. This Equilibrium is dispersed throughout the whole universe. Mathematically and Electrically Zero entities are Matter Atoms. Such a Zero is only an External Electrical Neutralization. The Possibility of Addition of terms in any one of the series is so rare that it seldom, if ever, happens in the known universe. Subtraction is illustrated in radioactivity. Atom Zeros exist for billions of years without experiencing any operation of the foregoing type. Our mathematical operations are of very limited application to macroscopic entities and hence not of basic or a priori value.

The matter world starts with its ninety-two series. In this matter world there are cases of the Operation of Addition of members of the same series, these constituting the molecules like oxygen, hydrogen, ozone and sulphur. The Addition of members of different series gives the hundreds of thousands of molecules and the Aggregates carrying us into the region of cohesion, adhesion, surface tension and like phenomena, a region of great but not infinite complexity.

A correspondingly complex set of operations takes place within the subjective world in the interpretation of the sense stimuli as they flood into these regions. Out of these are fashioned the " Molecular Perceptions " and " Conceptions." Unfortunately the subjective series has not been analyzed as has the objective series so that we deal only with the macroscopic aggregates and operations, the ideas, willings, desires and emotions of psychology.

The ordering of the entities will depend upon the nature of the marking and the laboratory system of study. Suppose that we had a mineral specimen with radium atoms in it and we wished to arrange these atoms in a series according to the length of life of these atoms before they were transformed into atoms of radium emanation. This type of ordering would be very different than one that would depend upon the space distribution of the atoms among the lattice work of rock molecules. The problem of ultimate entities also involves the determination of the ultimate orderings among these entities and it is upon the character of these orderings that the ultimate number and mathematical systems and operations are to be built. The term " Natural Numbers " is a misnomer. Several different types of numbers have been defined by geometry. Let A and B be two Points on a Straight Line d and " a " a section of this line. Start from A and Mark off a series of sections equal in Length to " a " and of number n. n can always be made sufficiently great so that B will lie upon one of the sections. These are the Archimedean numbers. Non-Archimedean numbers (including our common numbers) can be devised that will obey the laws of Addition, Multiplication, Calculus and the Transformation of Inequalities without obeying the Archimedian assumption. These new numbers intercalate themselves in the series of our common numbers. The aim of the Laboratory is to Discover the Ultimate number Systems and the Ultimate Objective and Subjective Mathematical Operations. At present the Allegory of Electron Mathematics is given to indicate how restricted an outlook is that of seeing only the Cave Shadows of Plato. The Operation of Adding a Negative Electron to a Positive Nuclei to produce a Zero Mother Atom is very complex. This Operation may be the source of many microscopic number systems that are represented by the integers of the formulae of Spectrum Line Series such as those of Balmer and Ritz. (See New Science, p. 62). The Operation of Electrical Addition may be performed in many ways.

Geometry, like the science of numbers, starts with its artificial axioms and its macroscopic ideas and laboratory apparatus such as mechanical compasses and rulers. Out of this complex it constructs a consistent system such as that of

Euclid. Euclidean geometry is metric and is based upon the Mechanical Conception of Magnitude. Projective geometry conceives of Continuity, Points and Lines at Infinity and so transcends a Laboratory system. Projective and Descriptive geometry employ methods of transformation that are Allegories of Shadows and Light Lines. An Ultimate Geometry of this kind is one that employs the Ultimate Entity Transformation that Spontaneously, and mayhaps unconsciously, operate in the objective and the subjective worlds. Analytic and metric geometries involve the Mathematical Exterpolations of the number systems besides other Exterpolations such as Direction and Space. The Non-Euclidean geometries arise in spaces different from that assumed by Euclid and the Einstein Gravity Light Effect has been stated to mean that we do not live in an Euclidean Space.

The Entities of geometry may be derived analytically or synthetically. We may define a Line as the Path of a Moving Point, a Surface as Generated by a Moving Plane and a Solid as Generated by a Moving Surface, all being Extended Allegories of our own Macroscopic Mechanical World. Consciousness, floating down through the universe with the Quanta of Energy, would hardly devise such a geometrical Story. The other process frankly takes a Solid with Length, Breadth and Thickness and, throwing off each of these Parts, one by one, comes to surfaces, lines and points. A Point is then an Entity without any Parts. "Space" is closely associated with either Points or Solids in an Inextricable Relativity Complex. A Point without Parts in an Antinomy and can only be used in the Laboratory in connection with other Points as a Relativity Complex. We can speak of the complex of a space of points, a space of planes, a space of surfaces or higher spaces of solids or supersolids. The Dimensions and the Contents of space will depend upon the laboratory view point. Accidentally we live in a mechanical world and use light signals of practically an instantaneous velocity so that our every day world can very suitably be considered as a three dimensional world. The artificiality of the axioms of geometry is true of all the systems and is especially illustrated by a metric system like that of Euclid's. The only Real Geometry is that which deals with natural Entities and Operations based upon the Ultimate Entity System of Unities and Laws.

The assumptions of Euclid include; those of Association or Projection such as the assertion that through two points one, and only one, line can be drawn; the Between Assumptions such that if three points are on a straight line, one, and only one, point is between the other two; the metric or congruent assumptions referring to sections of lines, angles and triangles; the postulate on parallel lines; and the Archimedes

assumption, by means of which numbers can be defined. Hilbert has shown that an infinite number of geometrics can be built upon these principles. By the assumption that to a system of points, lines and planes it is impossible to adjoin another system of objects such that the complete system satisfies all the other assumptions, we obtain Euclidean Space. By omitting the parallel line postulate we have Non-Euclidean geometry.

A fundamental theory of projective geometry is that of Desargues. This theoem can be proven in two ways: by using projective and metric assumptions of the plane or by using the projective assumptions of the plane and space. The theorem could be discovered, either by an intelligent entity of a two dimensional space who would see displaced in his plane rigid figures analogous to our solid bodies and who would know the metric assumptions, or by an intelligent entity of a three dimensional space who would know the projective assumptions of space but none of the metric assumptions.

We have seen that there are several sets of number systems and the different spaces may be described by means of coordinates of these differnt kinds of numbrs. There is thus introduced the non-Archimedean, the non-Arguesian, and the non-Pascelean geometries.

Questions immediately arise as to the application of the proper numbers and geometries to the different entity systems; for it requires laboratory as well as logical proof to apply the common numbers, the system of rigid coordinate axes and the Euclidean space properties to an assembly of electrons, energy quanta, electric fields and mental entities in a given Region. It may be found that certain regions of phenomena can be best represented by a special mathematics. The New Philosophy asserts that there is one Ultimate Unique System of Number, Geometry and Operating Apparatus (compasses, rules, carriers of "points," "lines," "planes" and "solids," ways and means for determining equality, identity, parallelism, straightness, motion, etc.) and Principle. The quality of Direction, the Distinction between Electric, Magnetic, Gravity and Radiant Energy Lines and the Means for defining the Track of a Moving Entity are problems that must be reduced to Ultimate Principles in an Ultimate Philosophy of Mathematics. Unfortunately Mathematics is now almost as thoroughly in the Bondage of the Mechanical World as Language and Science.

During the nineteenth century exact knowledge developed along two directions. Among great principles applying to the totality of the macroscopic world we have the law of the conservation of energy, the second principle of thermodynamics.

the electromagnetic equations of Clerk Maxwell and the several forms of the theory of relativity propounded by Einstein. Parallel with the announcement of these epoch making postulates there has been the development of the kinetic theory of gases and heat, microscopic biology, radioactivity, spectroscopy, the phenomena of ionization and the theory of energy quanta by Planck. In all of these fields of scientific exploration the ether is a postulate that is invariably introduced in some fashion. Many a missing link in the cyclic flow of events is attributed to some intrinsic property of that silent component, the partner of the third, the partitioning of energy through or by means of the ether.

When chemical atoms were little round hard elastic spheres, when life forms were functions of the forces of natural selection and so many of the phenomena of light were described by the theory that interference, shadows and polarization were due to undulatory motions of an elastic solid, the mechanical philosophy of phenomena was at its height. In the electromagnetic theory of Maxwell it was assumed that the ether was subject to stresses and strains. The problem then arose as to whether the ether was stagnant or whether it accompanied the earth in its rotation about its axis and about the sun. All physical experiments to detect any relative motion of the earth and the ether have given negative results so that the theory of a perfectly stagnant ether came into vogue. The theory of a stagnant ether reconciled the negative results of efforts to ascertain the relative velocity of the earth and the ether if it was assumed that the length of bodies decreased in the direction of their motion. This hypothesis of contraction by Fitzgerald and Lorentz encountered a grave difficulty when it came to the explanation of rotation. In the rotation of a wheel, according to this theory, the rim would contract while the spokes would not change their length. In 1905 Einstein proposed the theory of relativity and this has since taken a number of forms. In the theory of relativity it is generally assumed that it is impossible to ascertain the absolute motion of a body from observations made upon the body itself. The velocity and the acceleration of a body can be measured in only a relative sense in which an arbitrary motion is assigned to a second body. Velocities and coordinates of position are relative to some axes whose origin and direction are assigned at random or by guess. A stagnant ether might be acceptable for some absolute definition of coordinates but our very failure to even detect a method of measuring the relative motion of matter and the ether is taken as a postulate of the theory of relativity. Numerous other postulates have been added to this one of the relativity of motion. One of the earliest of these was the un-

satisfactory assumption that the velocity of light is a constant independent of the motion of the observer or the source. The "Equivalence" hypothesis asserts that the field of gravity is equivalent to a uniform acceleration of the coordinates and cannot be differentiated therefrom. The gravitational forces are given as fictitious a character as was a centrifugal force in our older mechanics. The laws of science are invariant as regards the intensity of the gravitationl field in which their laboratory discovery was made. It can also be asserted that our geometry is some other than Euclidean and that it contains singular regions, kinks and twists, otherwise known as gravity fields of force. (89) THE CENTRAL EFFORT IN THE PHILOSOPHY OF RELATIVITY HAS BEEN THAT OF MAINTAINING THE FORM OF THE LAWS AND RELATIONS OF SCIENCE AND OF EXPERIENCE INVARIANT RATHER THAN THE SCAFFOLDING OF THE COORDINATE SYSTEMS USED TO AMPLIFY AND DESCRIBE THESE LAWS. In the problem of the rotation of a wheel we not only assume that the length of the rim contracts as the rate of rotation is increased but that time is expanded so that the invariancy of the wheel structure is maintained while it is our units of length and time that are warped. The older view was that the units of the c. g. s. system were invariant and upon this system all metric science was erected. Relativity philosophy maintains that these units of length, time and perhaps inertia, are not invariant, but it has not intimated any set of absolute units upon which to build a metric science. The shortcomings of present relativity theory therefore are based upon the assertion that the artificiality of our standard units is irremediable and permanent. It postulates a lack of faith in our future progress of atomic knowledge into canons of creed and axioms of philosophy. It is the epitomized statement of unbelief in the most essential aims of a struggling experimental science. It asserts that our fundamental units are parts of a Minkowskian continuum of space and time from which we can never isolate them. This continuum is intimately and mayhaps indissoulably connected with the basic structures of a purely idealistic view of phenomena. This continuum is therefore more complex than the purely physical theory would indicate. Its weakness lies in its negative outlook. It asserts that the absolute cannot be attained. It makes the idea of absolue motion meaningless and yet there is a deep feeling in us that the meaning of absolute motion and energy content is not a purely mental mirage but that these terms resonate to reality. It is always the part of our true inner intuition to hold faith rather than to postulate our agnosticism into a system of philosophy. It is well indeed to investigate systems based upon such postulates as

those of the theory of relativity but it is necessary to be optimistic too.

The world line of a particle or a light wave is the integral of its equation of motion. According to the Newtonian laws the world line of a particle that is free is a straight line and is the same for all observers. The general theory of relativity is that all the laws of nature should be invariant as referred to the axes and the coordinates and the artificial units of value of the space time continuum. The laws of light and electromagnetism agree with this condition but the laws of gravitation do not. If the laws of gravitation were to follow the Newtonian law it would be possible to detect absolute motion and Lodge has made this application to the anamolous motion of the planet Mercury without being able to apply the assumptions generally. Einstein assumes that the space time continuum is not Euclidean and thus makes gravitational force as fictitious as centrifugal force. In the earlier form of the relativity theory the interval between two events was given by $ds^2=dx^2+dy^2+dz^2-dt^2$. In more recent theory the above expression only holds at a very great distance from the gravitational fields of matter. In the new form $ds^2=g_{11}dx^2+g_{22}dy^2+2g_{12}dx\,dy+g_{33}dz^2+2g_{13}dx\,dz+2g_{23}dy\,dz+g_{44}dt^2+2g_{14}dx\,dt+2g_{24}dy\,dt+2g_{34}dz\,dt$. There are ten parts added together to give the $ds^2$ in the above.

The g coefficients specify the gravitational field. These coefficients are practically limited to one set in which $ds^2=[1-2M/rc^2]^{-1}dr^2+r^2da^2+r^2\sin^2 a\,db^2-c^2[1-2M/rc^2]dt^2$. Here the mass M, the distance r, the velocity of light c and the angles a and b vary according to their direction of the element ds in a Minkowski continuum with the increments of dx, dy, dz and dt or their polar equivalents in r, a and b are considered. The fact that there are no adjustable constants permitted Einstein to calculate the deflection of light passing through the sun's limit. (For the derivation of the Lorentz transformation see the New Science, p. 88).

The great obstacle to present progress is our ignorance of the nature of the entity transformations that connect the objective and the subjective world as well as our lack of knowledge of the ultimate entities that compose these structures. As an antinomy of this Allegory of Ultimates we have the Allegory of Relativity. The Birth of Consciousness, "the Organ of Reality," came when the Soul Differentiated between that which It was and that which It Was Not. Consciousness is Pictured as a Relation and involves at least two entities. This makes an Equilibrium Trinity. The Relation may be viewed as an Equilibrium of Forces; of Lengths; of Wills; of Musts; of Imperatives; of Motions; of Loves; of Recognitions; of Processes; of Reason; of Times; of Crea-

tions; of Actions; of Masses; of Energies; of Effects; of Causes; of Orderings; of Operations; of Observations; of Descriptions; of Concepts; of Percepts; of Sensations; and the General Principle of Relativity asserts that in every Single Complex Two Ultimate Entities at least are involved. The problem of the Laboratory is to resolve these conditions of Relativity to the Minimum or the Ultimate Entities. A fundamental Problem arises as to How these Dual Complexes are Formed, the Nature of the Relating Third and the Ultimate Complexes. Materialistic Philosophy of the Newtonian age was inclined to view this condition as a Fallacy of the Subjective world and to picture the Absolute Existence of Independent Entities, Time, Substance, Ether and Space. Newton pictured space as existing independently of the bodies within it. A definite body occupied a definite portion of space independently of any second body. The idea of a Stagnant Ether was proposed to furnish axes of coordinates of an Absolute Character though of course this merely made the ether one of the entities. The idea of potential energy in the ether is a similar assumption of relativity required to complete the entities on each side of the Vibraton of a Pendulum, an Oscillation as of the balance wheel of a watch, a Harmonic Motion of an Electron in an atom or any Evolution in Cycles. Leibnitz supported the view of a relational space, a space that had no meaning beyond the assemblage of the entities that filled it. Such Relativity makes the term Absolute Motion meaningless. Our practical world has been (accidently) one of such small velocities that the laboratory and eye methods of observation could be assumed instantaneous so that all our velocities, masses and times that we describe have been approximately Absolute. Certainly most philosophers have viewed Time and Inertia as Absolute. Engineers, for instance, never consider the velocity of the earth in their ordinary energy calculations. So it is that the Relativists assert that we have been evolved in only an apparently Absolute world. In relativity the dimensions and properties of space, direction, motion, energy, force, consciousness, will, imperative, love, recognition, reason, creation, action, effect, cause, ordering, operation and definition depend upon the other entities that are involved in the assembly and may even depend upon the whole complex. Terms such as Absolute, Ultimate and Unique can only then cover complexes, or "Independent Systems" such as Equilibrium Trinities. The Relativity of Motion is one of the many conditions of the application of General Relativity Theory. The motion of two bodies is a matter of not only the two bodies but also the relations existing between the bodies. In the formulæ for the velocities of two bodies given in the Einstein physical theory of rela-

tivity we have the velocity of light involved because light was employed to relate the motion of the two bodies. Here the minimum Relativity Complex was taken as two mechanical bodies and light waves passing between them. The complex is more intricate than this because observers, light emitting and receiving apparatus, energy quanta, electrons, atoms, clocks, etc., are assumed. The Einstein Complexes are very macroscopic. The Newtonian system of units (c. g. s. units) escaped relativity interdependence on account of the fact that the velocities of the mechanical world are second order effects compared to the velocity of light. The "Absolute" Theory of Relativity may lead to every Entity operating in (various degree orders of value) terms of a complex function of all the entities. An Invariant Entity would not then be Knowable and would only function as the Container of entities that can only be described relatively. On the other hand if it is shown that all flux between entities must have a common velocity and that "low" velocities are due to the "entrainment" or the microscopic "storage" of flux relativity may be degraded from our present "velocity" relativity to a "direction" relativity or disappear altogether.

The Einstein physical theory of relativity inconsistently keeps the "Absolute" system of units of the Newtonian mechanical systems, such as length, mass and time, in the assumption that includes the use of mechanical bars and clocks in each of the mechanical bodies that are in relative motion. He keeps the unique laboratory system of using light signals among macroscopic and slowly moving rigid mechanical bodies but he does not fall into the error of Newton in neglecting this light velocity in comparison with the mechanical velocities. This is the improvement that Einstein has added to Newtonan philosophy. Space and time then become only two aspects of a single indivisible method of coordinating the phenomena in the complex under consideration. Carried to its logical conclusion each metric term of the complex is likewise a function of the observer (time and processes of making observations) and the theory of Einstein would make Length, Time and Inertia (of a Body) functions of the mentality of the individual as well as the velocity of the light signals employed in the laboratory. The definition of the simultaneity of events by the use of a clock involves subjective as well as objective phenomena. (This subjective element might be partially eliminated by the use of physically automatic laboratory apparatus, but Einstein has never suggested such a laboratory method. If there is found no change in the frequency of light waves as they traverse the force fields then an added value is given to the use of these frequencies as invariant entities.

The theory of relativity has successfully explained the

change of the inertia of the electron as the velocity is changed. It is in agreement with all those experiments that have given negative results to efforts to detect the relative motion of the earth and the ether. In the theory of relativity it appears immaterial whether we assume the existence of an ether or not. Phenomena that are consonant with the hypothesis of a stagnant ether are also in agreement with the theory of relativity. The theory explains the anomalous motion of the planet Mercury, the shift of the light waves as they pass through the gravitational field of the sun, due to their decrease of velocity and it provides an easy way for the derivation of the Lorentz transformations. The experiments of Majorana, in which the velocity of light was shown to be independent of the velocity of the source or of the mirrors from which it was reflected, are in full accord with the earlier postulates of the theory. The wave surface of light appears as a sphere with the observer in the center. This condition is completely supported by experiment. If one supposes two observers to have different velocities, and both to be positioned at the source of light as the time starts at zero each will see the same wave surface with himself at the center. The result is that the coordinates must differ, the coordinates of the two observers must be related by the Lorentz transformations, and they differ so that all optical and electromagnetic phenomena remain invariant. Whether the theory of relativity requires that the frequencies of the atoms should be affected by the intensity of the gravitational field about them is at present a debated mater. If they are the whole universe is flooded with a complex of the frequencies of the local centers of suns and stars.

The theory of relativity is statistical and ignores any possible structure to optical and electromagnetic phenomena. There are no mass particles assumed to explain the increase of the electron as it is accelerated. There is no corpuscular theory of light or a quanta theory of energy assumed in connection with the theory of relativity. (90) RELATIVITY CONDITIONS CANNOT EXIST UNLESS THERE IS AN INTERCHANGE OF FLUX BETWEEN THE TWO ENTITIES CONTAINING THE TWO OBSERVERS. BUT IT IS THE VERY STRUCTURE OF THE FLUX THAT MAKES THE NATURE AND THE CONTENTS OF THE ENTITIES ABSOLUTE. THE THEORY OF RELATIVITY IS A DENIAL OF THE ABILITY OF INTELLIGENT OBSERVERS BEING ABLE IN ANY WAY OF RECOGNIZING FLUX STRUCTURES. Yet modern physics is almost willing to abandon any attempt to describe the sources and sinks of energy, being content to find the structure of the relations that transpire between these

unknowable centers. It is this very ability that will permit these same observers to establish an absolute system of units. Not even Newtonian particles, points, electrons, atoms or molecules are described in relativity theory. Yet the theory assumes the laboratory apparatus that can only exist in a Newtonian world of low velocities. Even molecules and perhaps atoms dissociate when velocities approaching light are reached. The collision history of entities should provide records denoting (at least limits) the absolute velocities of particles.

There exists a condition of relativity in the definition of our units of the centimeter, the gram and the second that is closely allied to the conditions of the relativity of motion. Neither of these units is defined by itself but its definition is a part of the continuum or relations of physical law that is used to define all three units. The laws assumed to define these units are based on Newtonian mechanics and Euclidean geometry. It is therefore the height of inconsistency to employ these units and erect upon this metric basis a theory of relativity. The problem relating to relativity is that of establishing a new set of units based upon invariant natural laws or relations. The type of our geometry should be determined by natural law. The basic units should point the way to a proper coordinate system. No matter how we twist, rotate, move, accelerate, translate, distort, build up or destroy our coordinate systems and any other artificial descriptive framework, the fundamental relations that serve to define our units should remain unaltered. At present the law of the conservation of energy is the most fundamental in science and yet our mathematical methods are so crude that the most concrete concept that we have, namely kinetic energy, is described by all the vagaries of coordinates, x, y, z and t, that can be warped, twisted, torn, and macerated in an infinite number ways by an infinite number of observers. Laws such as that of the second law of thermodynamics, the conservation of energy and the postulates of relativity theory are statistical averages of innumerable atomic details in which an infinite amount of microscopic flux has been lost. It is apparent that these laws cannot serve as the basis of an absolute atomic system of units. These must be found in the microscopic world. In the objective world then the fundamental units appear to lie in the structures of energy and of electromagnetic wave motion. It is a long and difficult way ahead to isolate these entities.

In a larger sense problems of relativity arise by reason of contrast, on account of the evolution of the entity itself, by the very reason of our confirmation of the event or the entity, by our acceptation or rejection of the entity and the aware-

ness within and the most general form of relativity theory should include the physical theory as one of its branches. It is this general form of the theory that should likewise be related to the general and fundamental units of our idealistic philosophy. These units are most likely to be found in the imperatives of the soul and the objective entities that carries with it the design of the evolutions that are to come. The mathematics, the number systems, logic, reason, geometry and science are to find their bases in the realm of the subconscious microscopically, and in God, macroscopically, from whence we "come" to be, we move and have our being, we evolve and then are transformed, either microscopically or macroscopically.

If the mind's eye was double and resembled uranium atoms with electrons rapidly revolving about their nuclei then there is great probability that we would clearly "see" in a 4-dimensional "curved" Space-Time Continuum.

The Covariant Tensors of the natural world include the electrons and their configurations into atoms, Molecules and Crystals, the Vital Tensors of Chromosome, Sperm, Organ, Body and Species and the Languagė Covariants of Letters, Declensions, Conjugations, phrases and sentences.

It is the "curvature" of the idealistic world that makes our actions zigzag from our professions. God is this world, free of curvature. Pat never minded the falling. It is doubtful if sin is distasteful to the hedonists. It is our World Line running into others that stopped Pat. It is ever immaterial as to whose motion that is involved, it is the nature of the World Line Coincidences.

## XVI. THE UNIQUE UNITS, DEFINITIONS, LANGUAGE AND LABORATORY SYSTEMS

The present units of Length, Time and Mass, as used in our practical system, are very valuable for the Newtonian world in which we now move and Describe our Being and they will remain as the language of the layman through our present food-raiment-shelter phase of evolution. Philosophically these same units are very objectionable and as long as philosophers continue to think in these terms there will be continual confusion and antinomy. The term Point is intimately related to the term Space and the use of the one involves the other in our present geometrical conceptions. In the same way the term Instant of Time is intimately and necessarily related to the term Infinite Time. It follows that our metric terms involve Infinite Time and Infinite Space since these terms are coagulated into one by the Relativity Trinity of Time, Length and Mass. Any philosophy (this includes all of our present materialistic philosophies) that is based upon our present system of units, involves all the inconsistencies of the system. The Force, Matter. Motion philosophy of Spencer is an example. This is the Atlas that Modern Science has devised to support the whole metric World of Knowledge. Because we have forgotten our microscopic genes, chromosome, cell and protoplasm life we have become mechanical macroscopists.

(91) THE UNITS AND THE DEFINITIONS OF OUR METRIC WORLD HAVE BEEN SELECTED IN THE PAST FOR THEIR IMMEDIATE CONVENIENCE. THEY HAVE NOT BEEN SELECTED AS A LANGUAGE. It is true that the centimeter gram second system was at first called an absolute system but the fallacy of this use of the term is apparent. Units and words (to be of value in Bibles and constitutions) should possess an invariant and absolute meaning. Units and definitions in the past have been made by the specialists. Engineers speak of the cross sections of wires in circular mills. In our use of the unit cube it would be just as reasonable, theoretically, to use a unit sphere. Areas and volumes could be expressed in terms of the most complex types of surfaces and solids as well as squares and cubes. But we are all metrical Cubists excepting as we describe the force fields. Heaviside proposed a unit of electrical charge that eliminated the term four pi in the equations

of electromagnetic wave motion. Such a definition would result if the unit electrical charge was considered as being contained by a plate condenser rather than a spherical condenser and would lead us to picture the electron as having a single electrical line of force rather than lines of force radiating out in all directions.

Our present system of units requires that every concept of a metric quantity involves the idea of space or time or both. Force is made a function of motion (which itself involves space) and for this reason we picture force fields as dispersed and measured on maps. Likewise the attempt is made to visualize energy into the kinetic form where it is considered to be understood. But kinetic energy involves the square of the velocity and therefore the coordinates of space. Mass is described and measured by means of motion phenomena. Even the Latent form of energy is spoken of in terms of Potentials that are mapped into space and the measurement of this energy involves lengths. This condition is universally held in spite of the antinomy that enegy is considered as possessing no Form, Shape or Volume. Geometrical terms such as angles involve Directions. The mental entities are not described metrically and are viewed as undirectional. The problem to be solved is to devise a system of units and definitions that will serve to describe all phenomena metrically. The problem appears to involve an antinomy because our sense organs and all our other metrical laboratory apparatus appear to be material and to exist in space so that the problem of eliminating the space nature of the fundamental units may seem impossible. It may be necessary to base our units upon the entities and laws of thought and energy. Our current ideas of the ether and the electromagnetic worlds are essentially related to space. The principle to be adopted in determining the basis of units should be the general principle of an absolute language. (92) THE ULTIMATE GOAL OF LANGUAGE AND THOUGHT IS THE DISCOVERY OF THE "INDEPENDENT" ENTITIES AND THE PROPER INTERPRETATION OF THE PERIODICITIES OF PHENOMENA. KNOWLEDGE IS TO BE "ABSOLUTELY" AND UNIVERSALLY DESCRIBED. THIS FUNDAMENTAL AND UNIVERSAL HOPE AND GOAL OF HUMAN ENTROPY IMPERATIVE IS EXHIBITED IN OUR EFFORT TO SET STANDARDS SUCH AS BIBLES AND CONSTITUTIONS. In the relativity theory of two moving bodies the aim is to employ "light signals" or some other means so that the Message is Independent of the Means employed to carry the Message. The ultimate source upon which is erected the hypothesis of a unique and basic language is the invariancy of the method-

'ology of the soul itself. But each soul is isolated and imprisoned by the objective world. A postulate in many philosophies is that it cannot be freed. Freedom might merge the individuals into One.

Our metric system is built upon the idea of an equilibrium and the neutralizing effect of adding entities. This is partly brought about by describing space and time in terms of Positive and Negative Coordinates. While Mass is always considered as positive, it is controlled by Forces, so that the idea of Equilibrium is attained by the introduction of Invisible Forces. There are conditions of " Zero," " Rest," Inaction, of slow progress amidst an environment of an almost Infinity of approximate Equilibrium conditions that are introduced by our present metric system. Positive and Negative Electricity is an Exterpolation of our positive and negative number system. Energy is given these properties by supposing, for instance, that Potentials at a certain Point are oppositely Directed and thus add to the Zero condition. These views may be due to some a priori character of the mental processes and they have been artifically introduced into our whole metric system. Perhaps automatic laboratory apparatus will approximate the elimination of these " positive " " negative " equilibria conditions by a thorough exploration and mapping of phenomena. For instance the history of the acoustic energy that is spoken into a telephone in New York and heard in Los Angeles might be recorded at many places by circuits connected to the main circuit and containing amplifiers and recorders. The recorded curves of the sound waves would give the energy distribution according to wave lengths. This telephone experiment deals with macroscopic matter and is difficult to describe without the use of length terms. The corresponding problem of the energy of a sun beam involves Planck's frequency law and the recording of the energy in each frequency would involve Recognizing the Particular Frequency Entity and Counting the Energy Quanta that are Contained there. The postulation of " potentials," zeros, equilibria and " steady states " is made to explain the disappearance or the appearance of phenomena that are usually " invisible."

(38) **The Philosophy of Counting.** Consciousness is " born " when " There " Is Established with the Awareness that Wisdom to Recognize Differences between Itself and the Non-Awareness. This may be the " Origin " of Units, Definitions and Language. Let us call this Array: Soul, Non-Soul, One, Two, Outer, Inner, an Equilibrium in that the Non-Soul is Held With the Soul, a Recognition of a Difference, a Recognition of the Identity of the Soul By Itself and

a Process of Counting. As this "Origin" of Consciousness is not remembered and has not been recorded in the laboratory; as it may be a condition for every cell or gene rather than a brain condition, we cannot elaborate the hypothesis. Indeed there may be no "origin" at all but an invariant power that resides among the immortal entities of life.

There is a fairly clear set of Principles that have long been included among the Laws of thought, the Principle of Identity, the Principle of Contradiction and the Principle of the Excluded Middle or Third. By the aid of thought and all possible laboratory wisdom we shall assume that we can Distinguish Identities. We can Count Identities. We can Mark the Entities we desire to recognize and so Name the Identities. Negative Electrons are Identical one with another because of the Principle that all our laboratory wisdom makes them so just as it established the second principle of thermodynamics. The method is now used in the laboratory to count the alpha and the beta particles. (93) THE METHOD IS ADAPTED TO THE COUNTING OF THE MICROSCOPIC ENTITIES BECAUSE THERE ARE SO FEW SPECIES OF THESE.

The relations that connect the Entity and the Not-Entity, or the Soul and the Entity, the excluded third, is one that is neglected by principles. The problem of this relating structure is especially difficult when one considers the problem of energy quanta and the subjective relating "structures." In our present metric system it is assumed that the relating third is of a low order of magnitude atomically.

The philosophy of counting relates entities into partly or wholly filled series of integers that are to be described by laws that are linear. Thus all electrical charges are viewed as numerical multiples of the charge upon the electron. Planck's law and the relation of force and work may be examples of the fundamental laws that are to connect the ultimate entities of the Natural System of units and language. The atomic numbers given by the law of Moseley and the Integers defined by the laws of spectral frequencies (Ritz, Rydberg, etc.) are examples. No Einstein principle of Relativity would appear to limit the "absoluteness" of these numbers.

(39) **The Energy Ether Laboratories.** The ether of space is characterized by the energy quanta that are conserved both as regards their magnitude and their direction. This radiant energy is propagated with the velocity of light, C, according to the equations of Maxwell. The ether also contains the potential energy in the forms of the electric field, F; the gravity field, G; the magnetic field, H; and what we will call the

soul field, S. There are a few known relations between these structures of the ether such as the effect of the gravity field of the sun upon the velocity of light and perhaps the effect of the gravity field of the earth upon the velocity of the wireless waves. Representing the structures of the energy quanta by R, there ought to be all possible experiments made to determine the total mutual effects between the R, F, G, H and S structures. As soon as a structure, such as the hypothetical energy quanta, becomes known, the possible ether relations are increased. Here appears the most fundamental research problems that confront philosophy and it is certainly reasonable to assume that the complete and the fundamental system of units, standards, language and number systems are to find their description among the R, F, G, H and S structures. All the R, F, G, H and S structures appear to have vector as well as scalar properties. A very intimate relationship exists between R, F and H, but as this requires the presence of matter for its manifestation, it is difficult to indicate the relationship in the case that the energy is moving in the pure ether. This relationship is such that it may be employed to define the condition that three directions are normal to each other. In this way rectangular coordinates along three directions x, y, z may be defined. The definitions cannot be made absolutely metric however because there is no known ether structure that is available for the definition of a length.

The observer and the laboratory might be imagined to be located upon a moving energy quantum with the velocity C. Presumably there would be as many laboratories as there are different kinds of energy quanta given by the law of Planck. The observer would experience the gravity fields G or Space Time "curvature" and also the F and H fields presumably. Whether he would feel the energy quanta that are traversed can only be guessed. If he does not, then all that is experienced are the stationary structures of the ether. If his own quanta laboratory is invariant there is no "time" and experience consists of only a one directional row of irregular F, G and H structures, none of which can be marked and referred to because they have been irrevocably and forever passed (also past in time).

The "experience" of a radiant ether observer may be called "subjective," "internal," unidirectional or ethereal. Such an observer could have no known means of communicating with his environment. No light signals that he would send (and no light emitting or absorbing mechanism would be available) would ever be reflected back to him All "experience" would be that which "happened" to "lie" on the "tracks" of the radiant energy as it passed through the ether fields and of these effects, the only one now positively known is that of

Einstein. There are no Points; Planes; Rigid Figures; Instants of Time; Cubes; or Spheres; no Will or Freedom. All experience comes involuntarily. In a medium where the velocity of energy flux was less than that of the light velocity in the free ether the velocity of the observer would have to be reduced to that of the medium. Yet we cannot, even in dreams, think of "change" independently of motion, space and time.

(40) **The Free Electrical Laboratories.** We can imagine an observer to be located upon a negative electron, E, or upon a positive nucleus, P, each one of these electrical charges being frequently called an electron. The Atmosphere of such an observer will be characterized by very intense electric fields or "curved" spaces. The electric lines have often been pictured as real and these lines might be usable for purposes of communication. It is also invariably assumed that these electric lines are not open but that they begin or end upon electric charges or are themselves closed curves. It is conceivable that signals and various means of experimentation might be carried on by the use of these lines. Such an observer would experience energy quanta coming in upon him from "all" directions and would experience the qualitative phases of space and time. Phenomena of attraction and repulsion in all their cataclysmic detail would be experienced during the Collisions of electrons. Space may appear three dimensional with normal directions and may be defined in terms of the velocity vector of the electron and its electric and magnetic field. An electron Eo at the origin of coordinates with velocity components u along x and v along y will exert on an electron Er (at a distance r from the origin on the x axis) whose velocity is U, V, W along the axes, a force Fox=—EovErv over C2r2; Foy=Eov E r U over C2r and Foz=o. The charges are in Electrostatic units, the forces F are mechanical and C is the velocity of light. Ordinarily it is assumed that the action takes place in two stages. The movement of Eo produces a magnetic field in the x direction Hx=—Eov over Cr2 so that Fox=H Er V over C and Foy =—H Er U over C. The resultant force is HEr over C times the square root of (the square of U plus the square of V).

(41) **The Matter Atom Laboratories.** The Ninty-Two matter atoms provide the basis upon which the whole visible objective world rests. These are the sarcohagi of the enormous quantities of latent energy that permit of the stable macroscopic world in which we move and have our bodies. It is here that Length, comparatively Fixable on Marked Points and Space appear. If we picture negative electrons as re-

volving in closed orbits in these atoms then we have our microscopic atom clocks that run for billions of years. It is in this region that the atomic groupings form the molecular complexes and provide us many fields for the investigation of the nervous and mind phenomena that at least accompany vitality. It is likely that the Intuitive nature of space and metric time are born of the structures that arise in the atoms. Pain may be the result of the electric fields set up by active electric double layers among the brain cell molecules. The large surface layers of the brain would support such a view. Pleasure and happiness would result from the harmonic ordering of these same fields.

The fundamental characters of the soul are to be related to the great axiomatic, ultimate and a priori visions that it experiences. Near the region of the ultimate we "must" include the idea of space, or the closely associated entity, a marking point. Why does space appear as having three dimensions rather than n? One reason is that energy may be three dimensional. Electromagnetic phenomena, as illustrated in the motion of the electron, are at least three dimensional. This latter would afford a strong reason for associating the structure of the soul with electromagnetic phenomena below the atom structures. It has also been suggested that a three dimensional space is the only one in which the number of normal planes is the same as the number of axes. If we do not perceive potential energy space and time may be always one continuum.

In gravitational phenomena a small disturbance leaves a circular trajectory finite in a three dimensional space while in a higher space the attracted particle would go off to infinity in a helical or spiral orbit. Elliptical orbits exist in a two and a three dimensional space both for Euclidean and non-Euclidean spaces. It has been stated that only circular orbits are possible for an electron in a Bohr atom when space is higher than three dimensional. These are geometrical peculiarities of a space of three dimensions that may eventually possess a meaning in subjective phenomena. The differential equation of wave motion also possesses singularities in a three dimensional space, especially as regards the retarded potentials.

The mental world phenomena exhibit a method of transformation that is analagous to the coding and the decoding of messages on telegraph lines. At the receiving end there are two typewriters, A and B. Messages are given to A in letters as arranged in our usual writing. The instruments A and B are connected electrically by a in such a way that a letter or figure of A is transformed to some other letter or figure of B. The letter q to p, w to o, e to i, r to u and t to y. The message is then sent over the line MMMMMM in this

coded form and at the receiving end the typewriters are connected in the opposite manner and we have p changed to q, o to w, i to e, u to r, and y to t. In some way as this the sense organs A receive and send messages to the mind MMMMM but these messages are probably transformed when they are received by the nerves B by a transformation a and then again when the nerves transmit the message to the mind by some transformation b. When the mind transmits messages to the object world some similar but reversed series of transformations are employed in the form of xXyY. The elements B and Y or the nerve cells, consist of billions of billions of billions of molecules so that the ultimate structure of these transformations is extremely complex. The invariant quantities that take part in these transformations would appear to be energy quanta and electric charges. One would expect the memory records to be made by the electrical charges forming permanent molecular structures in the brain while consciousness receives its messages by means of energy quanta. The subjective world would appear to receive and direct a correspondence with the objective world by means of the series of energy quanta. The great problem of science is to determine the covariants of these transformations.

(42) **The Mechanical, Chemical and the Thermodynamical Laboratories.** These are the regions in which most of our bodily stimuli and our exact scientific laboratories now operate. This is the region of the C. G. S. system of units and the present scientific philosophies. The nature of the New Units will be described in terms of the system that is now used in these laboratories. It is of course fully understood that there is not at present sufficient data to define these new units. This is the region of the World Science based upon Relativity Principle.

The negative electron of charge E will be adopted as the ultimate unit of electrical charge. In a similar way energy quanta will be assumed to be built of multiples of an ultimate quantum called R. The number of the energy quanta and their fundamental relation to the structure of the matter atoms is indicated by the lines of the x, the gamma rays, the light and heat waves and by the atom numbers as given by the law of Moseley. The laws that describe the combination of the electrons, positive nuclei and the energy quanta are much more basic than those that give us the laws of mechanical motion. The c. g. s. unit of electrical charge is 2,000,000,000 (E). The size of the elementary quanta of energy is unknown though minimum values have been assigned. The value of one erg being equal to $9(10)^{16}$ quanta (R) is an estimate. The frequency of the gamma rays from the heaviest

atoms are the highest frequency events known and serves as the sorting agent that determines the greatest condensation of energy and inertia into objective world structure. Let this energy be MR=hn according to Plauck's law, h being Planck's constant and n being the frequency of the hardest gamma rays. This may be the Penetrating Radiation for which there is evidence of existence beyond our atmosphere. Planck's law can be stated in the form N=HR where H will describe a series of energy quanta that define frequencies N. Time (T) can be defined in periods such that there will be a series of periods just as there are a series of frequencies TN=I. There will be a series of wavelengths (L) such that CT=L. This system of E. R. N. units can be made to define L and T units. Having given E and L and a force field (F) or "space" curvature.

Mass, (M) in the mechanical world, can be defined from F=MA where A is C divided by T.

| **Present Mechanical Units.** | **The Unique Units.** |
|---|---|
| The square root of a term is indicated by enclosing it in parentheses. | |
| Length L. Area $L^2$. Volume $L^3$ | $C/N$. $C^2/N^2$ $C^3/N^3$ |
| Time T. Velocity L/T. Acceleration $L/T^2$ | I/N, C, the velocity of light, C N. |
| Mass M. Frequency I/T. | $R/C^2$ N the frequency of unique structure. |
| Force $ML/T^2$ Energy $ML^2/T^2$ | RN/C. R, the energy of the smallest quantum. |
| Electric Charge, $(KL^2M)/T$. | E, the charge of the electron or of its smallest part. |
| Capacity KL. Specific Inductive Capacity K. | $E^2/R$. $E^2N/CR$. |
| Resistance T/KL. Electric Field (M)/(KL)T. | $R/E^2N$. RN/EC. |
| Permeability $T^2/KL^2$. Megnetic Pole (LM/(K). | $R/E^2NC$. R/EN. |
| Magnetic Field $(KLM)/T^2$ | $EN^2/C$. |
| Polarization (KM)/(L)T. | $EN^2/C^2$ |

1. C may be universal and may measure the velocity in the "ether atoms" and all other macroscopic velocities may only involve the addition of certain frequencies, absorptions and emissions to the "ether atoms" velocity. The "structure" of the "ether" may involve a definition of N and R. C, N and R may apply to subjective as well as objective phenomena.

2. The new units do not appear with fractional exponents.

3. N represents the order or the "coding" of the flux of energy quanta while R represents the structure of the quanta. R and N furnish the basis of the universal language.

4. R, N, C and E are universally distributed. The power to recognize and identify these entities may be the a priori and immortal content of the "soul" or its atomic constituents.

5. The freedom of the soul lies in its power of "coding" the R quanta, of partitioning energy. Thus "time" and "space" are born.

6. "Absolute" knowledge may be the power of identifying the magnitude and directive qualities of the R quanta.

7. The highest frequencies are associated with the heaviest atoms, such as the gamma rays from uranium or its disintegration products. The shortest length and interval of time would be related to this greatest frequency. As these atoms are macroscopic it follows that the unique atomic frequencies are not known. The above table is temporary. We need to know the structure of quanta.

8. The units "should" N and R appear as the language of the soul. It may be realistic if the soul entity does not contain E or all of the E parts or it may be idealistic if S and the E parts are identical or S includes the E and other parts.

9. Constants such as H, in Plauck's law, are of fundamental importance. Their full significance requires much more laboratory development. The value of H has been obtained from the total radiation constant; the Wien constant; the theory of atomic structure; Einstein's photoelectric equation; Lewis and Adams' theory of ultimate rational units and the quantum relation applied to ionization potentials. These processes involve different powers of E.

10. Space, Point, Time, Direction, Coördinate Systems, Motion, Force, Inertia and Acceleration are derived conceptions that originate from the primitive preconscious methodology of the life entities, involving "absolute" entities such as we now "picture" to be represented by R, E, C and N.

11. Children learn reams of the rhythm of nursery rhymes before they spell words of artificial letters. The sperm and the ovum appear to lead "chemical" lives. Artificial parthenogenesis, by chemical methods, indicates the "intimate" relationship of the physical and the psychical. In both worlds there appears the antithesis of force and freedom. The principle of least action and the motion of a free particle do not explain why an electron should apparently rotate in the uranium atom for billions of years in a very small closed orbit. What differentiates the "bound" electron from the "free" one? How can we reconcile our idealistic freedom with our state ofmaterialistic bondage? How can we consider our idealistic philosophy of an artificial and impotent culture as basic when the sperm and ovum go together to develop the man?

12. The condition that atomism applies to portions of phenomena leads us to believe that its application is general in a uniform universe. If parts of a "chain" are links they all

must be. We naturally ask whether some of these links must ever remain hidden. They are so at present. Our working hypothesis is that they need not remain undiscoverable. Only the ultimate steady states are unrecognizable.

13. As soon as we select axes and units of space and time we adopt a system of relativity. Each fundamental system of units has its system of relativity. The new set of units is selected with the view of attaining a minimum of relativity, a relativity that concerns the "recognition" and the "counting" of entities. Between two observers separated by matter there appears to be an indissoluble "curved" Space Time 4 fold.

14. The atomic system of units does not picture any radiation that is universally penetrating as gravitational forces are now pictured to be. Action means absorption. Effects, events, energy, motion, phenomena, periodicities; the disturbance of equilibria; these are handed on, transmitted, conducted, radiated atomically. There are definite limits in every direction.

(94) ALTHOUGH THE NEW SYSTEM OF UNITS IS PROVISIONAL IT DOES PROPHESY WHAT SHOULD BE AIMED FOR IN THE FUTURE. IT CLEARLY SHOWS HOW MUCH MORE FUNDAMENTAL OUR EXPRESSIONS WILL BECOME WHEN THE LABORATORY CAN USE ELECTRONS, THE QUANTA OF ENERGY AND SIMILAR ENTITIES AS STANDARDS. IT IS ALSO CERTAIN THAT SPACE AND TIME ARE DEPENDENT AND ARTIFICIAL CONCEPTIONS AND ARE SEEMINGLY NOT FUNDAMENTAL OR THE PROPER BASIS UPON WHICH TO ERECT A SCAFFOLDING FOR THE DESCRIPTION OF ALL PHENOMENA. UNTIL WE HAVE AN ETHER LABORATORY, OR ATOMIC KNOWLEDGE OF WHAT WE ATTRIBUTE TO THE ETHER, THE SYSTEM OF ATOMIC UNITS WILL NOT BE COMPLETE.

(95) THE NERVE LANGUAGE IS TO BE PICTURED AS UNIVERSAL AND TO BE BUILT UPON LETTERS OF ENERGY QUANTA, THE MOTION OF IONS AND THE FREQUENCIES OF OUR COMMON OBJECTIVE WORLD. NO CORRECT PHILOSOPHY OF IDEALISM, REALISM OR MATERIALISM CAN BE ERECTED UNTIL WE KNOW THE ATOMIC CHARACTER OF THE NERVE LANGUAGE AND ALL THOSE PROCESSES OF COMMUNICATION BETWEEN THE ENTITIES OF LIFE, INCLUDING SUCH EVENTS AS PARTHENOGENESIS.

(96) IDEALISM CAN ONLY COME INTO ITS OWN WHEN IT PROVIDES A SYSTEM OF UNIQUE UNITS

AND RELATIONS UPON WHICH A UNIVERSAL LANGUAGE CAN BE ERECTED AND IN WHICH THE OBJECTIVE WORLD WILL BE A PART. THE SOUL APPARENTLY FEELS AND KNOWS THE LETTERS OF THE UNIVERSAL LANGUAGE AS PARTS OF ITSELF. AMONG THE ENTITIES OF THE IDEALISTIC UNIVERSAL LANGUAGE ARE THE IMPERATIVES OR THE POWERS OF THE SOUL TO DIRECT THE EQUILIBRIA OF THE OBJECTIVE WORLD. THIS PROBLEM IS INTIMATELY RELATED TO GROWTH AND HEREDITY.

(97) THE A PRIORI AND THE A POSTERIORI CHARACTERISTICS OF THE IMMORTAL SOUL ARE TO BE GIVEN BY THE UNIVERSAL IDEALISTIC LANGUAGE.

(98) THE TERM VITAL ENTROPY IMPERATIVE IS USED TO DESCRIBE THE RELATIONS OF THE DESIGNS OR THE IMPERATIVES THAT THE VITAL FORCES MANIFEST. THE TERM ENTROPY IS USED AS ANALAGOUS AND INCLUDING THE ENTROPY QUALITY OF THE THERMODYNAMIC WORLD. THE SECOND LAW OF THERMODYNAMICS MAY BE PICTURED AS THE URGE OF THE OBJECTIVE WORLD TOWARDS A CONTINUAL GROWTH OF ENTROPY.

(99) EACH LIFE ENTITY IS ASSUMED TO BE AN INDEPENDENT SYSTEM IN MUCH THE SAME SENSE AS THE ELECTRON. SELF CONTAINMENT OR INDEPENDENCE IS INTIMATELY RELATED TO IMMORTALITY.

(100) THE NUCLEUS OF THE HISTORY OF THE PAST AND THE PROGRAM OF THE FUTURE IS CONCENTRATED IN THE LIFE ENTITIES.

(101) THE IDEALISTIC UNITS AND THE ELEMENTS OF THE UNIVERSAL LANGUAGE ARE INVARIANT AND REAL RATHER THAN PARABLE AS IN AN ARTIFICIAL LANGUAGE.

(102) CONDITIONS OF RELATIVITY ARISE IN THE RELATIONS OF THESE ULTIMATE ENTITIES WHEN MORE THAN ONE ENTITY IS IN A CONDITION OF FLUX WITH ONE OR MORE OTHER ENTITIES. IF A LIFE ENTITY IS COMPLEX OR POSSESSES PARTS THAT ARE SUBJECT TO ISOLATION THERE ARISES THE POSSIBILITY OF INTERNAL AS WELL AS EXTERNAL RELATIVITY. WE WILL HAVE TO STRUGGLE LONG AND ARDUOUSLY BEFORE WE WILL BE EMANCIPATED FROM THE HANDICAPS OF RELATIVITY THEORIES.

(103) THE WORKING HYPOTHESIS OF SCIENCE, NAMELY THAT ALL PHENOMENA ARE KNOWABLE, COMPELS THE FAITH THAT ULTIMATELY ALL RELATIVITY THEORIES MUST BECOME EXTINCT. ONLY THEN CAN THE SOUL ACHIEVE FREEDOM. AS SOON AS WE ASSUME A RELATIVITY HYPOTHESIS IN THE OBJECTIVE WORLD WE DESERT IDEALISM.

(104) THE LIFE OF EACH LIVING ENTITY IS TO BE CONSIDERED AS AN INTEGRAL OF AIMS THAT IS SUBJECT TO EXPRESSION, AN INTEGRAL THAT IS AT LEAST SACRED TO THAT ENTITY AND EXPRESSES ITS INNER URGE TO ITS AIM OVER A PATH OF LEAST ACTION (TO USE THAT PRINCIPLE OF MECHANICS AS A PARABLE AND SPACE AS AN ALLEGORICAL TERM). YOUTH EXPRESSES THE SPIRIT OF THE IMPERATIVES ENTHRONED WITHIN. HERE WE HAVE THE PURER EXHIBITIONS OF IDEALISM AND DEMOCRACY.

(105) IT IS PERHAPS BEST THAT YOUTH SHOULD NOT FULLY KNOW THE EXTERPOLATIONS OF OLD AGE ELSE IT MIGHT LOSE MUCH OF ITS FAITH, ENTHUSIASM AND OPTIMISM.

A GREAT PROBLEM OF IDEALISM IS TO SOLVE THE APPARENTLY CONFLICTING IMPERATIVES OF THE LIFE ENTITIES. HOW CAN WE PREVENT BRUTE, ECONOMIC, INTELLECTUAL AND THE PARADOXICAL IDEALISTIC WARS? MUCH OF THIS PROBLEM IS CONTAINED IN THE SYSTEM OF EUGENICS.

MONEY, BUILDINGS, SOUP HOUSES, PRODUCTION OF THE MATERIAL AND "BUSINESS," AS THESE TERMS ARE USUALLY EMPLOYED, EVEN BY THE CHURCH, THE UNIVERSITY, CHARITY AND OTHER FORMS OF SO-CALLED UPLIFT, ARE INSULTS TO ANY WORTHY SOUL. THE PROBLEM OF SOCIETY IS TO MAKE JUSTICE, HONOR, THE EDUCATION THAT TEACHES MANHOOD, EUGENICS, THE WEALTH THAT THE VITAL IMPERATIVE REQUIRES, AND POWER PERFECTLY FLUID. TO MAKE MONEY LIQUID IS A VERY SMALL PART OF THE PROGRAM. THE IMPEDIMENTA OF OUR COMPLEX CIVILIZATION MUST BE ELIMINATED. SOCIETY MUST HAVE A PROGRAM FOR THE AGES AND NOT BE THE OPPORTUNIST OF THE PRESENT DAY.

INDIVIDUAL MEN SHOULD NOT HAVE TO SPEND MUCH OF THEIR LIVES CREATING INDI-

VIDUAL OPPORTUNITIES BUT THESE SHOULD BE MADE PERFECTLY FLUID BY SOCIETY. WE ARE TO BE GIVEN A PHILOSOPHY AND ALL THE POSSIBLE MEANS FOR ACHIEVING A FULL MANHOOD. UTOPIA CAN ONLY ARISE WHEN SOCIETY IS ITSELF IMPELLED BY A PURE PHILOSOPHY OF IDEALISM.

RELIGION IS NOT TO BE BLINDLY TAKEN FROM AN ANCIENT MYTHOLOGY. ITS ORIGIN IS IN THE INNER KINGDOM, THE KINGDOM OF HEAVEN OF CHRIST THAT IS WITHIN. THE ORIGIN OF LANGUAGE IS FOUND IN THE URGE OF THE SOUL FOR THE EXPRESSION OF ITS NEEDS AS WELL AS ITS POWERS. WHAT DOES NOT LIVE IN THE PRESENT IS DEAD.

THE FUTILITY OF A GOLD STANDARD OF VALUES WAS AMPLY SHOWN IN THE GREAT WAR. EVEN MATERIALISTS OF VISION KNOW THAT OUR RESERVES MUST BE MADE OF FOOD, CLOTHING, COAL, STEEL, NITRATES AND MEDICAL SUPPLIES. IDEALISM HAS NOT EVOLVED ANY CERTAIN PLAN OF STORING A RESERVE OF MORALE FOR FUTURE MARATHONS. BUT PARENTS CAN TEACH CHILDREN PROPER IMPERATIVES AND WISDOM.

THE ALTRUISM OF THE MATERIALIST CONSISTS OF SOUP AND SOAP. THE PHILOSOPHICAL SOCIETY OF MOST MEN AND WOMEN IS THE 7 G ASSOCIATION, GREAT, GRAND, GABBLE, GOBBLE, GRAB, GET AND GO COMPANY.

HOW CAN THE MIND GET FROM WITHOUT WHAT IT CANNOT CONTAIN OR GIVE TO THE WORLD.

GIVE ONE "RELATIONS" AND ONE WILL INVARIABLY CONSTRUCT A WORLD OF ELECTRICITY, MATTER, MOTION AND FEELING.

## XVII. THE VITAL ENTROPY IMPERATIVE AND THE IMMORTALITY OF THE SOUL.

The attempt to express the solution of the problems of life in terms of a single formula is beset with many difficulties. The Golden Rule can be used by the capitalist and the communist. It does not rescue us from bondage to our animal, food and thermostat aims of life. The more Golden Rule, to see life through the "eyes" of the other life entity does not give us any more wisdom than this entity itself possesses. The consistent opium user can honestly will that all men shall use opium according to the categorical imperative of Kant's Militarism. We know that excuse of "Personal Liberty" that was so sacredly, selfishly and alcoholically cherished during the Age of Booze. What is the meaning of the inner Kingdom of Heaven that Christ came to establish? Here it is that we are to find the Imperative of Life. But so meagre is our present language and education that few see and interpret the writing on this inner wall. The paradox is the problem of inculcating the inner imperatives for external teachers and priests.

Poisoned by the toxins of our Serpent Germ Enemies, we deny that we ever knew of Freemen. We see the madhouses and the cages of habit in which we live: we see the tables about which we worship the food that so poorly nourishes us: we see our actions domineered by Greed, Pride, Power and Envy: we see the beds in which we are born, love and die: we see ourselves chaotically driven by hate and fear in our own economic, moral and ethical treadmills: we see ourselves ruled by the Superstitions and the Ignorant Superficialities of a Multitude of heathen philosophies: we are thwarted in our aims: we crucify Inspiration, Creative Power, Love of Wisdom, the Youthful Spirit of Quest, the more mature Spirit of Research and Invention, the Muses of Literature, Music and Art: and all over the earth we see the Crosses of the Crucified Christ and the Sons of Heaven. How the Kingdom has been ravished by the treacherous passions and the abysmal brute spirits of its subconscious selves, ambushed in the darkness to dethrone the Dignity of Widom and Duty? How even the soul staggers in its inner Program before the Toxins that lead to Suicide and the Persecutions of its fellow life entities? How often Judas betrays his Master for a few pieces of silver? How the infinite throng of respectable and opportunist Pilates

ask, What is Truth? In the temptations of our perpetual Gethsemane we ask: Why Wisdom rather than Ignorance? Why seek Truth rather than abide luxuriously in Error? Why Love instead of Hate? Why not Pain in place of Pleasure, Disease in place of Health, Alcohol in place of Water, and Opiates, Heroin, Morphine and Venoms in place of Flavors, Hormones and Vitamines? Why should we not get through the world as "easily" and "shrewdly" as possible? Why should we not ignore the sufferings and the Crosses of our fellows and live in the Luxury that we can Grab? Why not continue to feed and burn our children's souls in our economic Molochs and make Specialists of all of them, farmers, lawyers, undertakers and priests: and in their conflagrations to Success give them the devil's wealth and an environmental education to the full, so that none shall develop their Souls? A Man is not to be God, but good for something. We do not (except formally) ask who You are but who do you represent? How the Serf Peasant Specialists Hide away among their Clods of Clay Talk when a Man comes into their midst? How men Shun Thinking and revert to Tradition, Mythology and the other Antiquities of the Dead Past. How Religion reverts to Ritual and Dogma? How every man and every institution of man has been impelled through Stupidity and Heart Error to Havoc and the Terror of Death? "What might have been" should fill every soul with Humility and Repentance. There is no soul that is filled with revenge for any man or institution but what gratification will come to it if it waits, "for all things come to those who wait." Ashes to ashes and dust to dust is the epitome of history.

In our Perplexities we ask, What are the imperatives, the ethics and the morality of the sperm? Was that splotch of mud once the rosy lip of a maiden fair? Why do the brightest eyes and the warmest hearts grow cold in death? What teleology designed the symmetry of your body about the gravity lines of force? Are the electrons in that clod of clay the ones that wig wagged a mother's sacred love to her child? Did this water flow in the veins of some ancient Iguanodon in the bogs of a Mesoizoic landscape? How do the sunsets come to inspire your Hope, the carbohydrates to form your brain cells and the continual impact of billions of billions of billions of air mlecules perpetuate the warmth of your body? Why does Habit Petrify and Ossify all that is Human? Why do we say with devilish glee that "All is Fair in Love and War?" Why does Barbaric Might play such an important role in Natural Selection, in the Carnage of War, in the Struggles of capital and labor, among all the specialists, between the varied hued philosophers and among the self called christians? Why is it that in every nook and cranny that gold enters there is

strife? Why is punishment a matter of depriving one of life or the glitter of the environment? Who does not expect to "outlive" his relatives and those whom he envies, despises and hates? Who does not consider Possession Sacred and Nine Points in Law if he is the Possessor? Does not the man that whispers and secretely deals with his fellows as thoroughly rob as he who gets into the clutches of the law? How the weak like to Hurt you into pitying them? How the society woman tries to cut and pierce the heart? How we laugh at Punch and Judy? How the impatient Grave Robbers begin to steal long before the hands are stilled in Death? How people lie by Flattery, Chicanery and a Feigned Interest? How all men plan to reap not only all that they sow but all that their neighbors, their ancestors and their children sow as well? Only the Habits of their old age and the conflict of their common Purposes prostrate their aims. How men would leave only an impoverished earth to the hordes that their sensual lusts had created to starve? How few apply Conservation of resources to the Kingdom of the Soul? How actions repudiate even the dim faint shimmer of profession? How long would civilization endure if the actions of men were handed to posterity instead of their words? How revolting are the lives of the Elder Statesmen of Wealth, Position, Politics, Art, Grand Opera, Education, Religion, Science, and even Philosophy? How men must advertize and pilfer to Succeed? How the gossiping little men shun Christ, Moses, Solomon, Buddha, Kant, Washington and Lincoln as to the elements that made these great? How the Profiteers tour among the crosses of Flanders Field? What would be left of the earth if men could take all they wanted with them to the grave? How Youth is cajoled to make the Supreme Sacrifice in Altruism while Age lolls in ease? What a Hell earth would be if Death did not remove the Neros, the Pilates, the Persecutors that burned the martyrs and the Kaisers that fattened upon militarism? How can the Blind Love, even of Youth, remove the sacrilege from marriage that makes man a child of nature and a creature of circumstance? How can men be rescued to Freedom when even the education of the Christian church is that of binding the youth to the dogma and the mythology of the Past? Every child is carelessly taught to be a Great Imitator. Creed and form words are stamped upon their growing and still plastic minds. We instil the ancient ritual and are alarmed if there is even a reacting revolt. How memory entombs our actions in caskets of Pleasure and Achievement when we vaunt them to our children? How malicious happiness; devilish joy; short lived enthusiasm; prying curiosity; sweet revenge; the robbery of our fellows; the dissipated opportunities that had been granted us by our

fellows; vicious habits and bondage to virtue; all grin and chuckle when we speak of the Free Will of Man? How Death (the void of the philosophies and the parade of what we detest in our daily life) and Ignorance stare at us when we speak of Wisdom? How Happiness and Pleasure wear a different aspect as old age, ennui and failure come on apace? How worldly success, fame and failure destroy the humanity of man? How our so called great are lying in wait to use us when we are beguiled to believe that their souls are wrapped in the desires of service? How Might must be resorted to in order to preserve Right? How Will must be employed to emancipate Freedom? How our efforts to lift others prevents our own advance? How Socrates is driven into the streets by his shrew wife Xantippe? How Nietzsche the prophet of the supermen, is poisoned by his own toxins? How Aristotle views our philosophy as the silhouettes of objects seen by men entombed in a cave? How Plato of the Republic was the master of the human souls of Slaves? How Christ Died upon the Cross for those who would not be saved?

What is our answer to be to the problems that arise before us? How shall we live? What shall be the compass of our life? To what far country shall it guide us? The reply of the atomic philosophy is to look within. The sperm is a concentrated atom of love that is analagous to the concentration of electric field about the electron. The genes are believed to carry the teleologies of life as the nuclei in the atoms carry the character of inertia and those forces that hold the worlds together. The urge of the genes, the cells and the animals to be social and to intermingle, as well as those operations that direct the growth of all the wonderful structures of the sense organs and the brain out of ciods of clay, make a series of which the whole development of man is but a small part. In the objective world there are a series of aggregates that are being fashioned from what we call the ultimate entities. Entropy is a thermodynamical term that tells the direction of changes in the macroscopic world and this principle of entropy change has not been interpreted for the atomic and the electron worlds. (106) WE MAY EXPRESS THE CHANGES OF THE OBJECTIVE WORLD AS BEING DEFINED IN DIRECTION BY A GENERAL LAW OF ENTROPY AND THE TERM GENERAL ENTROPY IMPERATIVE MAY BE CONNOTED TO MEAN A CONTINOUS CHANGE THAT PERVADES BOTH THE ORGANIC AND THE INORGANIC WORLDS. THE UNITY OF PHILOSOPHY IS DEPENDENT UPON THE UNIFIED EXPRESSION THAT CAN BE MADE TO DESCRIBE THE EVOLUTIONS. THE PERIODICITIES OR THE FREQUENCIES OF PHENOMENA.

THE MILE POSTS THAT MARK THE PATH OF GENERAL ENTROPY ARE THOSE ABIDING SYSTEMS OR CHAIN OF SYSTEMS THAT WE FIND ALONG THE WAY AND THAT CONSTITUTE THE WORLD FOR US. That which survives carries the philosophy of entropy whether it be an electron, a uranium atom, a nitrogen molecule, a mountain or a human being. What we shall eat; whether we shall walk by the sea or up the mountain; how we shall avoid the toxins; why we should become converts to the unique philosophy; these are answered by the inner imperative if they are most carefully "watched" and "tended." We can only see a part of the possible vistas of experience and the inadequacy and conflict of the older philosophies has been due to the lack of the overlapping of the experiences of the men who deivsed them. Until we know how our own inner entropy imperatives grow, our sense organs, and the billions of cells and are able to operate them, we cannot be said to have attained anything like a complete philosophy. The atomic philosophy postulates that the microscopic imperatives contain all of the macroscopic imperatives and a host of others. The finer imperatives are highly concentrated. Microscopic religion is as intensely powerful as the forces operating in the radiocative atoms. After death we either become microscopic or macroscopic, we either go to heaven, to hell or to an attenuated nirvana.

(107) THE FIRST PROBLEM ENCOUNTERED IN THE EXPRESSION OF THE VITAL IMPERATIVE IS TO ASCERTAIN THE NATURE OF THE ATOMIC TERMS THAT COMPOSE THE SERIES THAT GIVES THE GENERAL ENTROPY EXPRESSION ON INTEGRATION. ALL THESE TERMS SHOULD BE A VOLUNTARY PART OF OUR CONSCIOUS EXPERIENCE. The steps in the evolution of life are to be felt. The prememory epochs of our lives are to be investigated The other entities are to be known internally as well as externally. If an "electron" wills then we are internally to recognize that willing. If Christ still lives then it is our duty to be in communion with him; not only through the agency of the ink splotches on faded parchments that are interpreted only through our own experience, but by the vital communion of two souls, a blending that we can only speak of by such a Parable as a mixing of sound notes or the combination of colors.

As the pendulum of uranium chloride swings to and fro it experiences the motion of the earth through space, the sunshine, the chemical bonds that unite the uranium and the chlorine, the oscillation of some of its energy back and forth to the gravity field of the earth, the oscillations of the outer

electrons of its molecules and the intense "force" relations that exist between the beta and alpha particles and whatever else constitutes the atom nuclei. The uranium chloride may have been formed millions of years ago when the earth was young. The uranium atoms appear to have been formed in the pre-earthian ages when the universe was young. The life of the uranium atom is estimated to be about nine billion years. Its electrons and alpha particles may be very much "older." Its quanta of energy may be eternal. (108) IN GENERAL THE PARTS EXPERIENCE ALL THE PERIODICITIES OF THE WHOLE. THE COMPLETE AND CONTINOUS ENTROPY HISTORY OF PARTS CAN ONLY BE READ WHEN THESE ARE MICROSCOPIC. THE CURRENCY THEN BECOMES REAL PIECES OF SILVER AND COPPER. AS THE PARTS BECOME MORE MICROSCOPIC THE INDIVIDUAL EXPERIENCES BECOME INTENSIFIED. PERMANENCY" IS MICROSCOPIC. THE TOTALITY OF FLUX IS ALSO MICROSCOPIC. FLUX IS THE ORDERED CHANGE THAT IS TO BE EXPRESSED BY THE INTEGRATION OF THE HISTORIES OF THE ULTIMATE ENTITIES AND THAT (MACROSCOPICALLY) CAN BE DESCRIBED BY SUCH LAWS AS THOSE OF THERMODYNAMIC ENTROPY AND RADIOACTIVITY. IF THEN MUDDY URANIUM CHLORIDE ENCLOSES SUCH A KINGDOM AND SUCH AN IMMORTALITY. SHALL WE DESPAIR OF THE GLORY OF THE SOUL?

If the above phenomena are described as the flux of energy between the "kinetic" and the "potential' forms, the oscillation between live and dead matter may be described as an analogy. In the organic world there is a series of parts in which the potentialities of life become concentrated. The flux in these systems is to be described by entropy law that may be as exact as that of the inorganic world. Though not clearly seen, we may assume that in this world it is the microscopic entity that possesses permanency. (109) THE HISTORY OF THE MACROSCOPIC IS ESSENTIALLY CARRIED BY ITS ENTITY PARTS. THE EVOLUTION OF THE MACROSCOPIC IS THE INTEGRATION OF THE FLUX BETWEEN THE ENTITY PARTS. DEATH IS ONLY A FLUX OF THE VITAL ENTITIES INTO A POTENTIAL FORM AND IS NO MORE MYSTERIOUS THAN LATENT RADIOACTIVITY AS IT LAYS BURIED IN THE URANIUM ATOM FOR BILLIONS OF YEARS. THE MACROSCOPIC APPEARANCE OF LIFE MAY BE AS RARE AS THE PHENOMENA OF RADIOACTIVITY AND THE ENTITIES OF LIFE MAY

BE AS UNIVERSAL AND AS WIDELY DISTRIBUTED AS THE BETA AND THE ALPHA PARTICLES. IF WE HAVE NOT EVEN REMEMBERED THE DIRECTION OF THE GROWTH OF OUR BODIES BY MICROSCOPIC LIFE ENTITIES IT IS NOT UNREASONABLE TO SUPPOSE THAT THE FINER MICROSCOPIC WORLD HAS LIKEWISE BEEN AND STILL IS A PART OF US. THE UNIVERSALITY OF DISTRIBUTION OF HYDROGEN, OXYGEN, NITROGEN AND THE OTHER MATTER ATOMS ASSOCIATED WITH LIFE MAY AUGUR A UNIVERSAL DISTRIBUTION OF THE LIFE ENTITIES. DEATH MAY MEAN THAT OUR SOULS DISSOCIATE INTO BILLIONS OF BILLIONS OF BILLIONS OF IDENTICAL EGOS JUST AS OUR MATERIAL BODIES DISINTEGRATE INTO BILLIONS OF BILLIONS OF BILLIONS OF MOLECULES. The soul appears the center of diverging atomic systems, the macroscopic systems going out to the stars, and the microscopic system going into the concentrated centers of will and force, soul atoms, ether atoms and electrons. The paradox comes as to how either system can be indefinitely extended or how it can have an ending.

The entropy character of life is positively expressed in the lives of all of us according as we free ourselves from the slavery of specialism. What should be more tiresome than the continual founding of John Hopkins' Universities for millions of years by Gilman? What would be greater drudgery than for Webster to continue rewriting his dictionary while the uranium atoms all escaped the ennui of their steady states by an outburst of radioactivity? Who wishes to go back through his youth again though we all pine for the treasures of youth? What people is willing to go Back to nature to live? Even those who aim to conquer Death do not aim to push backwards the course of life so that we become babes and eventually split into a sperm and an ovum. Death, as a condition of macroscopic disintegration, may be staid but the inner urge will no more permit of the backward tracing of the cycle of life than will the thermodynamic world. Here is a condition of absolute law that only awaits an atomic description. Here is an absolute ordering of phenomena that wells up from the microscopic world. (110) MOST OF THE IMPERIAL DOMAIN OF THE LIFE ENTITIES MUST BE DIRECTED BY SUBCONSCIOUS ACTION. THE IMMEDIATE PROBLEM OF THE HUMAN RACE IS TO REDUCE OUR ANIMAL, FOOD AND THERMOSTAT LIFE TO THE SUBCONSCIOUS REALM AND AT THE SAME TIME THROW OUT OR INTO CONSCIOUSNESS ANY AND ALL VITAL EXPERIENCES AND URGES THAT

WE MAY DESIRE IN THE ULTIMATE PHILOSOPHY THAT APPEARS AS THE GOAL OR THE INTEGRATION OF THE ENTROPY SERIES. FREEDOM IN THE CONTROL OF EQUILIBRIA IS TO BE AUTOMATIC OR CONSCIOUS JUST AS WE "LIKE" OR AS IS DETERMINED TO BE "BEST." THE ENTROPY INTEGRAL INCLUDES THE IMPETUOUS LOVE OF THE SPERM, THE CELL SOCIAL SYSTEM THAT DESIGNS THE SENSE AND OTHER BODILY ORGANS, THE DIVINITY OF A MOTHERS' LOVE, THE INSTINCT PROCESSES, THE CHARACTER SCHEME, THE EVOLUTION OF LIFE ON THE EARTH AND OF THE INDIVIDUAL THAT APPEARS AS ITS SHORTHAND REPRESENTATION IN THE COURSE OF CIVILIZATION. The philosophy of life does not "originate" with our memory or our apparent state of consciousness in early childhood any more than does the evolution of men "begin" with the first appearance of a spoken and a written language unless we define the word "Begin" to mean whatever we wish. The a priori content of the life entities at various stages of their existence are as yet unwritten and unread. Instead of the a priori forms of Kant, such as the categories, the a priori content of the life entities appears as simply the power to track a path of entropy imperative among the multitudinous equilibria that flow to and from them. As seen in our conscious memories, all knowledge is inextricably woven with the flow of flux to and from the sense organs.

The slavery of our age is apparent even in the holy of holies. Who knows of any individual that is permitted to follow the dictates of that still small voice within? Who is permitted the freedom to do and to develop a life which he believes to be of true value? Even in the laboratory we are eternally being asked, what is the application of our work? No man is allowed to work along the lines that he feels are the most promising unless he is financially independent and even then people are all nervous to see results. If you wish to see how little Faith there is in the world try to live out the pure informal research imperatives of Christ. Applied research is just a little more utilitarian than the so called pure research work and unless you publish and publish, you are almost nonexistent. (111) THE VERY CONDITION OF KNOWLEDGE IS SUCH THAT WE DO NOT KNOW THE ULTIMATE GOAL OF WISDOM. PURE RESEARCH WORK CANNOT THEREFORE HAVE AN INTEGRATED AND EXPRESSIBLE GOAL AT PRESENT. IT CAN ONLY FOLLOW THE DIRECTIONS OF THE COMPASS WITHIN. ITS POLAR STAR HAS NOT YET BEEN SEEN. IT IS ONLY THE MAN WITH

WISDOM (IN THE LABORATORY) THAT IS IN A POSITION TO DIRECT HIS OWN AND THE WORK OF OTHERS. THIS CONDITION IN NO WISE CONTRADICTS THE EXISTENCE OF ABSOLUTE SIGN BOARDS ALONG THE WAY. THE NATURAL ATOMIC SCALE IS THE ABSOLUTELY POSITIONED STRUCTURE. As a matter of scientific fact we do not know the cause or the nature of the earth's magnetism, the origin of the sun's heat and the nature of the penetrating radiation. The " Compass " and the " Entropy " Allegories and Imperatives are " fragmentary." Even the most skilful mathematician cannot develop more than a very short program for the laboratory. It is the shortness of our lives, the fierceness of our animal struggle, the limitations of our laboratory powers and our crying needs, overwhelming to the sympathetic soul in the death room, that weigh us down with the responsibilities and the duties that are impelled from within. Until mankind as a whole is educated and eugenized to hold this position civilization will be but the phantom ghost of what it might and " should " be.

The Entropy Imperative of Life Flux has wrought the eye, the heart and the brain through the eons of its operation. The short epochs of historical man and our yet shorter individual memories are superficial compared to what preceded. We ought not therefore to despair of this entropy operation too quickly when the toxins flood us about. What an acceleration in this entropy would take place if Men were full fledged Youths and Platos for thousands of years with the Cares of the objective world Carried by automatic machinery and laboratories? Press an electric button and such a Plato is taken by an automatic subway express from Athens to join Christ in Bethany. Turn a subjective handle and Demosthenes speaks not only by wireless to the Men of the world but also to those in Venus and the planets of Sirius. He speaks not through a flesh mouth full of pebbles but from an immortal soul. The Entropy Imperative of life is to be read from Within and that Withiness is to be one of a long culture, not only with itself in the wilderness but with all the other Withinesses, by the language of the soul. The Entropy Imperative may direct each Soul through the whole Gamut of Phenomenal Flux. We have expressed our hearts and minds in terms of phonetic words and splotches of ink. (11) THE ENTROPY IMPERATIVE IS TO BE ACCURATELY SPOKEN BY THE LANGUAGE OF THE SOUL AND TO BE INDELIBLY WRITTEN IN THE LETTERS OF THAT ULTIMATE TONGUE. IT IS THE RELIGION OF LIFE. The meaning of this can be intimated only in our environment words. You can feel why you would wish a

certain man to hold your hands in your final grasp on your couch of death. The eye speaks infinitely more than the poor mouth, the soul infinitely more than either. If we could only speak to Men like Christ by eye and by soul. (113) THE ENTROPY IMPERATIVE OF LIFE CAN ONLY BE FULLY EXPRESSED IN THE NEW LANGUAGE, RELIGION, MORALITY, ETHICS AND PHILOSOPHY OF THE SOUL. IT IS THE METHODOLOGY OF GROWTH AND EVOLUTION. THOROUGH EMANCIPATION CAN ONLY COME TO US WHEN WE HAVE BECOME FREED OF THE LANGUAGE, LOGIC, ETHICS, MORALITY AND PHILOSOPHY OF OUR PRESENT PHONETIC AND INK CANTATIONS AND RITUALS. The absolute nature of this new entropy is vaguely to be seen in the principles and atomic methods that are being exploited in the physical world. The extension of these methods throughout the realm of phenomena is a part of the preliminary program of the new philosophy. No criticism of the entropy imperative can be made as regards lack of definiteness because it affords a very far reaching and a pressingly immediate program of laboratory work. The unthwarted entropy imperative is the thoroughly offensive tactics of youth.

(114) THE PRINCIPLE OF LEAST ACTION IS CLOSELY ASSOCIATED WITH THE SIMPLE LIFE. CHRISTIANITY IS THE PERSONIFICATION OF THE SOCIAL DEMOCRACIES OF THE CELL COLONIES. THE VECTOR CHARACTER OF VITAL ENTROPY IS SEMI-OFFICIALLY MAPPED BY WISDOM, VISION, INSPIRATION, FAITH AND LOVE. TRUTH IS THE COMPASS TO GUIDE US IN THE EXPERIENCE OF THE LABORATORY. THE STILL SMALL VOICE OF THE SOUL IS THE TREASURE THAT IS TO BE EMBELLISHED BY THE CULTURE OF THE HIGHEST PHILOSOPHY ERE IT WILL BLOSSOM FORTH INTO THE BEAUTY AND THE PERFECTION OF OUR ENTROPY GOAL. IT IS THE MUSICIAN DRIVING THE OSCILLATING EQUILIBRIA OF THE HARP INTO A SYMPHONY. No matter how we may yearn for perpetual motion the generalized experience of the laboratory expresses our inability to attain it macroscopically in the infinitely probable second law of thermodynamics. The program that is taken to the laboratory is an a priori one but it must be tested by experience. The vital imperative is the method and the process that is employed to map experience with a maximum of results and a minimum expenditure of effort but the map of life is the particular complex that this gives after its operation upon our individual experiences. (115) THE PRINCIPLE

OF GENERAL ENTROPY, OR VITAL ENTROPY IF WE CHOOSE TO BE THOROUGH GOING IDEALISTS, INCLUDES THE MECHANICAL PRINCIPLE OF LEAST ACTION; HAMILTON'S PRINCIPLE; THE PRINCIPLE OF A MINIMUM OPTICAL PATH; THE ASSUMPTION OF A VARIABILITY IN THE CURVATURE OF SPACE; THE ETERNAL URGE FOR SIMPLICITY AND UNITY IN THE MINDS OF ALL PHILOSOPHERS; THE CYCLONE PATHS OF THE IMPERATIVES THROUGH THE MAZE OF EQUILIBRIA; FAITH; LOVE; THE MEANING OF BEING A FREE MAN; THE IDEA OF GOD; THE COURSE OF PROGRESS; THE BEING OF A RED BLOOD CORPUSCLE; THE ACTIVITY OF A SPERM; GROWTH AND ALL THE IMPERATIVES THAT CARRY US THROUGH THE MOORS AND FENS OF OUR EARTHLY LIFE. THE GOAL OF THE ENTROPY IMPERATIVE IS THE "ABSOLUTE." The principle of general entropy cannot be else than universal for it must be a part of every soul or it is not known. Unless we are to have a multitude of independent and isolated philosophies and are to give up the hypothesis of a system of ultimate entities and relation values we must admit that the integral of all these as it describes flux must itself be a consistent and unified expression. But the condition that this integral is a universal one in no way defines or describes it. Its meaning is just as definite and at the same time indefinite as is that of God. We have explored certain portions of its domain and we know sufficiently to feel much inspiration as we go down to the life laboratory but our prophecies have a long, long trail ahead, which they mystify in much the same way that the compass perplexed the mariners of Columbus. As soon as we have a simple and universal law or relation we find that laboratory experience exhibits exceptions. The atom is found to contain electrons and then the electrons are considered to be complex. The entropy imperative may be composed of an absolute structure with non-interchangeable parts. It is essentially constructive as compared t o the restraint postulates of Buddha (as Nirvana) and Moses (Decalogian "Thou Shalt Not"). "Unless ye be as little children" in the entropy spirit of youth ye cannot enter into the inner entropy Kingdom. By losing its life the phogocyte blood corpuscle makes the essentially vicarious Christian sacrifice.

The operation of the principle of vital entropy is illustrated in the direction of equilibria. The powers of the life entities may be the most microscopic phenomena and may direct any kind of flux. Out of the ether waves and the inorganic molecules is manufacture the organic compounds by the plants.

From these storehouses of molecular energy the animals operate. (116) THE "UNDERSTANDING" OF THE OPERATION OF THE PRINCIPLE OF VITAL ENTROPY IS TO BE FOUND IN THE MICROSCOPIC WORLD. GREAT MACROSCOPIC PROBLEMS, SUCH AS THE PREVENTION OF DEATH, APPEAR AS INTEGRALS IN WHICH THE CELLS OR EVEN SMALLER ENTITIES APPEAR AS THE TERMS OF THE SERIES TO BE INTEGRATED. The directive power of vital entropy is seen in every process of our actions. We mine coal and haul it to our homes by the very energy of the coal. Our food is a store house of energy flux that we direct along certain lines. Whether we lift a body against gravity by an elevator or by muscular effort we are directing the flux of energy. No equilibrium can be imagined but that man can devise a means of controlling it if he is given sufficient time and the direction of the minor equilibria. If the astronomical laboratory should prove definitely that the earth was gradually leaving the solar system or slowly falling into the sun, either condition meaning the destruction of life, as we know it physiologically. man feels the faith that he will be able to circumvent this impending holocaust by some method.. If the earth was receding from the sun perhaps the shooting of sufficient matter from the earth into space away from the sun would give enough momentum towards the sun to keep the earth from going into space. The effect of the pressure of light might also aid. Indeed it may not be too much to suppose that life entities may be directing much more of the flux of the universe than we suppose. Remembering how much of our physiological energies are subconsciously controlled it is reasonable to suppose that the invisible life entities are operating in the unseen microscopic world. This view might lead us to monads like those of Leibnitz.

The entropy imperative is that which relates and integrates the minor imperatives, the musts, the oughts, the duties, the dignities, the loves, the loyalties, the rights, the likes, the responsibilities, the wills, the desires and the teleologies that mark the whole chain of vital flux. The visible part of this integrated series consists of the equilibria of the objective world. Of the two series it is to be assumed that the vital series is the more fundamental. The absolute system of values of the objective world are indicated to be the E R N series of units and these provide the basis of the language or the common relations that bind the objective and the subjective worlds. The unity of the entropy imperative is to be seen in the unity of philosophy as it is always striven for. We might picture the soul as the source of the power of imperative thought just as we view the pituatary body and the suprarenal

glands as the source of the hormones of life and order that bathe the life entities as the "light" of space interpenetrates the celestial bodies and provides the teleology of their destiny. Ultimately the ether and the electromagnetic world will find their interpretation in the scheme of life.

It may be justly asked how an entropy imperative can take on any form such as that of Least Action when we seem to see so clearly the prodigality of nature as she sows the seeds and pollen of life and apparently permits so many of them to struggle to an untimely, a painful and an inglorious end. The wealth of microscopic detail is so infinite that the why of it all is indeed perplexing. But it is equally certain that every philosophy, every science and the expressed life of every entity of life contains a teleology that at least partakes of the Principle of Least Action. The dreams, the vagaries and the ignorance of the human mind make us "falter" and "doubt" as to our destiny but are not these very words anathema to us and in themselves prove our principle. The pragmatist may ask how Entropy and Least Action Principles can be of any value in explaining the periodicities of the mechanical and thermal systems such for example as the age of the earth or of the uranium atom. How miserably the human mind fails to attain its goal through any route of Least Action. All is proclaimed vanity. Yet we all admit the value of our civilization, at times, and many might ask the value of pragmatic philosophy as soon as it leaves the tracks of the specialist and the region of fact?

The entropy imperative intimates the absolute entities of the subjective world to be parallel and more microscopic than those of the objective world and as the directors of the equilibria that relate the latter.

The entropy imperative emphasizes the importance of diverting our present system of money values and the things that are bought and sold to a condition where an automatic objective world will give us these necessities with a minimum of conscious action. It would also aim to change our present subconscious imperatives into conscious ones at will.

The entropy imperative impells us to a laboratory program that is beyond the conceptions of our present food thermostat animal stage of existence.

The entropy imperative emphasizes the importance of a Graduate Training for all and that one function of society is that of permitting these Trained Minds to produce a maximum by providing proper laboratory opportunities. Our present age is one of dense barbarianism in this respect. The waste resulting from the lack of opportunity for those that are trained to accomplish is even more extravagant than is nature's lavishness of life.

Lives are not to be crucified by the common people living under the slavery of specialism. Numbers and bigness are not to be worshipped. Eugenics is to be philosophically applied by the prophets and philosophers.

The socialism of the cell colonies and Christianity are important chapters in the entropy imperative system. What constitute chromosome and genes sin and imperative?

Punishment and the laws of restraint are to be largely or altogether annuled by the largeness of opportunity that shall surround us. When men make the Kingdom of Heaven their Destiny it will not be hard to keep them out of hell.

When men come to realize the serfdom of language and philosophy that now encompass us and when the urgings of the still small voice within is not smothered by our food, shelter, clothing and life impulses the entropy imperative for active millions of the earth will mean a working out of the Principle of a Minimum Path to the central goal, God. Why should numbers introduce famine, poverty, vice, ignorance, strife and continual economic war?

But how is the entropy imperative to be put into operation? To whom is to be delegated the power of eugencis? Has not every delegation of power in the history of man been prostituted? Has not every great nation disintegrated into ashes? Has not even the continued dominion of the priesthood been a curse? Has not conservatism always mastered the institutions of men? How hopeless it sometimes seems to expect the emancipation of man if this power is to be delegated to every soul? Yet this appears to be a part of the system of the entropy imperative. No systems are more democratic than the microscopic ones. No paths are more direct than those of the free entities. Electrons and quanta of energy are the very symbols of equality. It is only under the conditions of the macroscopic world that we find Anarchies and Monarchies. All souls may be alike. Environment is not necessarily that which exists immediately about us but that which has left its historical records for thousands of years. If we assume the origin of man from a single source, whether this is Adam and Eve or the amoeba like protoplasm hypothecated by biological evolutionists, we are lead to attribute the differentiation between the descendants as due to the effects accumulated by the action of the environment. This environment may be a pure objective one or it may take in life entities just as it adds on electrons and quanta of energy. There may be a standardization and an interchangeability of the parts of the life entities just as we assume this to be the condition relating the ultimate entities of the objective world. The idea of God and a Nirvana is sometimes associated with such a view. Should such a view be anathema in an ideal Democracy?

Our picture of the experience of life has been put into an allegory like unto that of a country that is explored and mapped by a compass. This compass may be a gyroscope or a magnet. The map is usually described by a macroscopic language of mountains, valleys, rivers and lakes. As indicating the nature and the process of map making this language is useless. In the same fashion our phonetic language is useless for philosophy. Our map is the natural atomic scale and its related series. Our compass is human Intelligence. Our map is the macroscopic complex of our subjective and objective bodies and our compass is that of the teleologically working entities of the cells and the genes. Its language is to be found in the miscroscopic world. However the properties, the successes, and the failures of the map may be accentuated in the properties of the compass that we use to make it, nevertheless the fact remains that this must be so. Macroscopic detail does disappear along the way, but in spite of all this, the still small voice of the inner imperative must be magnified and concentrated tremendously, almost infinitely, the opponent of atomism might say. Local deposits of iron ore deflect the compass. Hate, fear and envy distort our purposes. It so results that the "essential" features of our map are contained in many and relatively mutual relations between compasses. It so results that the "fundamental features" of the vital entities and their imperatives are manifested in the relations between entities. But cannot the "fundamental" structures be contained in each entity and in each imperative? Imperfection, wrong, evil, inconsistency and friction are macroscopic. Perfection is the extension of the inner structure. The integrated vital imperative is the goal when all the microscopic entities will have crystallized into their diamond Nirvana.

Celestially, philosophy takes us to the innumerable starry hosts of heaven, and the laboratory is now engaged in the gigantic task of photographing, studying and relating these entities. Microscopically, philosophy carries us into the realm of the yet more innumerable hosts of the life entities. Both regions may be inhabited by equally coordinated, unified and eternal entities. The macroscopic home of Suns and the microscopic home of the soul entities may both rest on a common base whose logos is the "unique" philosophy. The problem as to what is "vital," "essential," "fundamental" and "unique" "must" be taken to the laboratory. Herein lies the methodology of the entropy imperative.

The soul, within its cloistered cell,
Beyond the crash and din of shell,
No n dimensioned space does face: dull sheen of harmony is seen
Because its mien the senses screen: because collisions have not been
Soul strife in life.

Gross molecules placed round about
Stay cataclysms from without.
Electromagnetic beams inspire a faith in truer schemes and dreams,
They give the key to know and see, the living flux that ever streams
As light in night.

The urge within to rule without,
The quest to know, to free from doubt,
To pass beyond the prison cell, to cast away the wall of clay,
Require the fleeting wings of light, star melted in a Milky Way,
To life through strife.

Our present work is to complete
The inner growth the soul doth mete.
The sperm to grow into the Man, the Man to God to walk his way,
The realm of things to be the means that brings the shortest route to lay
From night to light.

(1) The imperatives of life must be harmoniously set, a state of well being that is to be approximated, a condition of resonance that is vaguely described as health, happiness, right living, mens sana in corpore sano, a matter of hormones and vitamines, the subconscious designing and direction of the soul, the a priori endowment of life, the instinct for unity and a route of minimum path in traversing the equilibria of flux, the postulate of unity as illustrated by the aim of every philosophy, God Goal of Man Soul me may aver.

Why should we fall so far short of this Imperative System and be deluged by the hosts of small imperatives into chaos? Why does sin hedge us in? Why did the tubercle bacillus add lustre to the mind of Robert Louis Stevenson and why did rum deepen the cavernous mystery of the Raven of Poe? Why do the poisons of bad teeth, the fibroid degeneration of the appendix, improper food and wrong drink, loose kidneys, eye strain, diseased suprarenals, cancer cells, obstructions in the breathing and digestive tracts, sagging colons, pyloric adhesions, indols, skatols and phenols sadden the glad impulse to freedom and carry us to our graves? Our Radiant life is to be as minutely written as the laws of the spectrum radiations. Radiant Love, Health, Cheerfulness, Courage, Loyalty and Freedom are to be microscopically described in the atomic imperatives. There is a joy in mutual Respect Service and Love. How the Animals and the Plants slowly but surely respond to our consideration, to our attributing them a place in our relationships and to our care?

Perhaps the idealistic units will be largely based upon those equilibria from which the imperatives are emancipated by the environment just as ionization is produced. These may be as simple as the structure of the electromagnetic world. Eugenics must operate upon the most microscopic of the imperatives. We read, "in the beginning was the logos," the word, reason,

the imperative. Inhibition may neutralize the imperatives just as electrons are neutralized by positive nuclei. Units, values and the power to perpetuate the right imperatives are aims of the new logos. Natural Selection deals with numbers, it is symbolized by sin, atrophy and death. The life entropy series is that which precedes the environment. Its purpose is to perpetuate what is "best" in itself.

(2) Our loathing to change our standards of life is due to individual inertia. Even death can not frighten us from the tightening clutches of habit. These forces are now more than balanced by the "rising" standards of the rejuvenated generations that succeed us. This is an exhibit of a normal imperative and faith. Old age is not universally in accord with this imperative as we all well know. We may feel sometimes that the function of death is to eliminate the discordant imperatives of old age. How the individual fails when this is true? But as we grow older, we reverse this view.

(3) Human slavery, in the superficial sense, has been lifted. Economic, moral, ethical, intellectual, emotional, physical, chemical and toxic poison equilibria slavery is as riotous, vicious and rampant as ever. The hope of Freedom lies in the microscopic country. Cells must be allowed "their" health and freedom. Freedom and Harmony are resonant with Imperative and Duty. Sin is a discord and an irrevelancy. We cannot have a macroscopic heaven of microscopic hells. The animosity and hate of cell and germ caste, slavery and warfare is most pronounced.

(4) We are born to our teleology or system of vital imperatives long before we see the light of day. Few men make this teleology the central theme of their conscious efforts. They are but parts of that accidental equilibria that the evolutionists call the struggle for exisence. It was Christ that erected a higher, a conscious and a human system of evolution to Service and Sacrifice. Sin arises in apathy and ignorance as well as in opposition. There are few philosophers and prophets. All others are sinners to their opportunities. Few get a vision of their duty and their responsibility, the necessity of their continued growth.

(5) The diffusion of the new language and philosophy promises to greatly reduce our temptations and our sin. What these fail to do must be accomplished by eugenics.

(6) Economic Freedom, Victory over Death, Eugenics, the Fulfillment of our Imperative to mens sana in corpore sano, the power to perpetuate that which is good through coming generations and the Philosophical Control of the Dollar and the Animal Love Imperatives are some of the immediate campaign problems of the New Philosophy. A grander soul, a better mind and deeper culture introduce the superman.

(7) The possible dissociation of the ego, I, and the other macroscopic unities of the objective world emphasizes the necessity of the establishment of a democracy of imperatives among the genes, cells and other entities of life. Herein lies a virgin field for Research.

(8) A real Ph. D. should mark the Commencement of the life work of every citizen in the Republic of the New Philosophy. Fathers and Mothers should lead their children in development. The church should be a serious institution ever affording the opportunity for soul growth. The present church is a stagnation. The church should ever lead. The Ph. D. should live the most efficient, simplest, wisest, serviceable and religious of lives. He should be Real. He should be a Teacher. He should be at home in the Kitchen, the Nursery, the Market, the School, the Church, the Lodge, the Farm, the Legislature and in Business. But think of the Contradiction of an Industrial Ph. D. and Superstition in "Religion" and "Truth."

(9) The "Irish Question" has been asserted to apply to the Struggle between the Sexes, between Old Age and Youth, between Races, between Localities, between Classes and Schools. The Imperative of the New Philosophy should be so Universal that all these Pagan Strivings shall waste away by the Atrophication of their causes. Hate, Envy, Jealousy, Fear. Arrongancy, Revenge and Cruelty are to be sterilized and their place is to be utterly filled by the wholesome Imperatives.

(10) As we speak of the spirit, conscience and life of a nation, so we may picture a Macroscopic God of life and even of "lifeless" phenomena. There is a unity of all phenomena, a plan, an imperative that is often called the "Will" of God. Good and evil, love and hate, rest and motion, positive and negative, heaven and hell, these are largely neutralized in a macroscopic, statistical God. It is in the microscopic world that we are directed to either a positive or negative infinity. The microscopic world is one requiring all the profundity and zeal of the new birth.

(11) We have the vision that the plants, animals and the people of any community can all be gassed. In this way a few individuals might entirely redirect the life of the earth. Biologists have reared scores of generations free of germs. Some day in the not distant future we humans may live germlessly. Our Euphoria may be free of toxins. We will consciously bathe in hormones and vitamines, "fountains of perpetual youth." Our physiology may become as exact as mechanics. We will exhibit the perfection of gyroscopes. We will be the Chancellors of our own Vital Entropy Exchequers.

(12) The Faithlessness of our Age in providing adequate

facilities to its philosophers is one of the sins of big business. We worship our institutions and fail to see our prophets and philosophers. Democracy is as likely to crucify Christ as a farmed out province of a Roman monarchy. Our Towering Stupidity includes the Integration of all kinds of Ignorance, Pride, Inertia, Hate, Envy, Apathy and Grabbing Selfish Imperatives in our Democracy. Civilian Cabinets, Business Trustees of Universities, the Spoils System of Party Politics, Dynasties of Corporation Direcors, Lawyers and Politicians posing as Pseudo-Statesmen, the Golden Calf Self Made Business men who pose as prophets and philosophers, and the multitude that never rise above the level of the daily paper, illustrate the Impedimenta to High Imperative Achievement. "Business" must be made the hand maid of philosophy.

(13) The biological Religion of the Father, the Son, the Son of God, my Father's Business, my Father's House and Love are to receive an atomic nomenclature in which the microscopic imperatives of the genes and the chromosomes may appear. The good, the beautiful and the true are to be carried into the microscopic world just as the mechanical terms are now described by electrons. Much of our macroscopic morals and ethics will remain but we shall be cognizant of the Exterpolations that these have engendered.

(14) "Popularity" is a criterion of social value in a Democracy and in many another kind of institution. So low has humanity fallen that unpopularity is often a more certain standard of worth. We assert that persecution purifies the church. An uncrucified Christ would be a paradox. An accepted prophet would be an anachronism. For Gibb's own countrymen to find him would be surprising. To read Newton, Kant and Einstein is to isolate oneself. A prophet may not be without honor after his death or beyond his own country but who would expect him to be recognized in his own home town. Yet as civilization advances and becomes more complex it becomes the more certain prey of the ungodly and of slavery to its own intricate structure. In the Republic of the New Philosophy every man must be a philosopher first and a specialist secondarily.

(15) A philosophy cannot give itself away to cattle dealers. Pearls must not "be thrown to the swine." Any people who do not discover and follow their prophets and their philosophers are barbarians and must be eugenized. Natural selection operates too slowly. It must be accomplished by the conscious imperative of eugenics. How can a specialist, a plumber, a lawyer or a farmer hope to associate with Christ and Socrates in Heaven? Only a Man can have this privilege here or in the world to come. If we do not seek to be Great here we will never be with the Great "There." To assert that

we are Christians because Christ was great, or that we are idealists because we "are told" that the Greatest Human Thinkers were idealists is but to say idle words. To lose the imperative to know the Great and to be Great is to atrophy and die. What is not "living" is dead. Philosophy should be the central harmony of life, education, knowledge, politics, business and all human effort everywhere. To burn Jeanne D'Arc at the stake and to make her a saint 489 years later is the sure sign of an atropied system.

(16) Modern Research Imperative has been likened to the urge of the gold miners, the ambitions of the Spanish Free-booting Discoverers and the strategy of guerilla warfare. Scientific efforts are said to be Balkanized. It is proposed to make them into an Imperial Structure. But the Saint and the Genius remain individuals. The macroscopic organizations of men have never succeeded in perpetuating their good qualities. Captains of Industry, Honorary Doctorates of the Universities, Chains of degrees, Chairs full of executives and administratives, eternal "production" and "consumption," competition, salary achievement, reports of "numbers," visible results, these have been some of the sirens that have sung to sleep the deeper soul imperatives of the past. Yet the demagogues shout more production and more consumption, the suffrage of women who have never manifested any promptings of prophecy and philosophy, prosperity and the upbuilding of all that paraphernalia of a material civilization that is more likely to imprison than to free us. They insult Men with a "Full Dinner Pail." The urge for dominion has been one of the most persistent and insidious of the imperatives of the individual and his institutions throughout all history. If this had been internal Dominion as well as external Dominion all might have been well. It is the atomic method that is rectifying this lack of perspective.

(17) To aim for Power alone is a mistake. Power is but means, a responsibility and a duty. Responsibility and Duty define Imperatives. No nation should aim for Dominion until it can generate a posterity that will fulfill the Obligations of that Dominion. Blind exercise of Power is as likely to be harmful as helpful. No church should aim to convert the world unless it can meet the Service, the Spiritual Uplift and the Sanctity of Leadership that such a Conversion requires for its Perpetuity. No University should aim to flood a community with Ph. D.'s unless an adequate field of Opportunity has been at least partially prepared. The ideas of the Prophet or even of a Man should be part of the imperative of our statesmen and educator leaders. The Imperative to Multiply and Replenish the earth has been Instinctive but even here the Replenishment of the earth is not necessarily a Blessing

either to the earth or to the Multipliers who know not whether their posterity are to be conceived in honor or in shame. Christ left no children, no estate and no external kingdom. The puzzling qustion arises as to how the earth is to be saved from the unfit. The aim of philosophy is to perpetuate the truth as it is found. Its purpose is not only to describe the entropy or true imperatives but to see the operation of these imperatives is maintained. What a mess of aims, actions and inactions true history records.

(18) Men have appeared to exhibit a munificent altruism in some spheres of action. Left in Africa, the colored man would have but tasted a few of the crumbs of civilization. But he has been carried to America to share the genius of Watts and Bell and the humanity of Lincoln. So democracy "equally" distributes its intellectual wealth and material prosperity. Even the "white man's burden" impels him to carry civilization to the four corners of the earth. The generosity of the vote grabbing politician is most heinous in its rank injustice to the intellectual toilers. "Be not dismayed" he says, it is the Will of the Great Majority. "They think not neither do they spin" and we are men ad hominem. The foreigner is allowed to enter as a hewer of wood and a hod carrier. Let not the cattle dealer think that he feeds the world. He may never be able to be a philosopher but every philosopher can feed and clothe himself. Let not the world be deceived in believing that the food vendor, the cloth weavers and the house builders form the fundamental structure of society. Only the prophets and philosophers are unreplaceable. Anybody can buy a piece of land with silver as Judas did. But the new philosophy must be concerned in perpetuating its own and eugenizing the oily tongued politician. The industrial scheme includes the Bastille, the Guillotine and the Great War. Yet to many it is a sin to tear down the Bastille.

(19) The problems of modern society are very complex. In many fields no one but the specialist is able to accomplish results. But the selfishness of the specialist often leads him to extortionate demands upon the public. This condition leads to a rule of might. On the other hand the opportunist politician does not know how to get results and he is equally selfish with the veneer of altruism advertised all over him. In each organization there is much conservatism. Lawyers continue the processes of the middle ages. The answer to these problems may consist in "partitioning" the functions of the state, the church, education, the branches of engineering, invention, medicine and so on, so that each branch of human welfare is administered by its own organic specialist democracy. Much legislative, judicial and executive power should be placed directly in the hands of the specialist democracies. But these

specialists must be Men and the central democracy would be the province of philosophers. No other "specialists" can take their place. This plan does not mediate the struggle between the progressive spirit of youth and the conservatism of old age. The problem of defining the regions of the democracies also remains. The idea of greatly increasing the length of life encounters the struggle of youth for power and the ennui of age. Perhaps the hormones and vitamines will perpetuate youth.

(20) The conversion to philosophy and the attainment of the limited mastery that our present philosophy permits us, leads to our paradoxical position of importance in a dollar world. Philosophers are not understood and often even unheard. They may be intentionally and severely persecuted. Be a little man and you have the company of the Big Crowd, be a Big Man and you are alone. Nearly all constructive work by a genius or a saint is neutralized by opposition. Egotism looms large. How lonely was Christ in the Garden of Gethsemane? How sorrowful was the life of Lincoln? How isolated is the great mathematician in his work? Yet it is the imperative of life that carries these souls far beyond the ordinary achievements of men's lives. A man "called" to an organization receives some mutual support from his fellows. A Christ is isolated. The proletariat grab all the wealth of civilization that they can. The possession of wealth and power curtails tremendous responsibilities. Economics should be built on the Christ Parable of the Talents.

(21) To what extent should the imperative be the child of our animal body? To what extent should wishes be fathers of thoughts? How much should the Pastor and the Philosopher ape the Politician as he kowtows to the common and worships power and preaches and teaches what is agreeable to the pupil? How much is philosophy to compromise itself with the superstitions of the time? Much of our Freedom is at the same time our Responsibility in answering problems such as these.

(22) How valuable is the love imperative as it has operated in the history of life? The answer is the progress of evolution. There are however flagrant crimes of love as well as the most bountiful blessings. The censorship of philosophy should immediately start to prevent these crimes. Plant and animal life have experienced a holocaust of eugenics, destruction and an artificial help from man and it is but logical that man apply the same process to his own species. As the earth fills with people this program of a philosophically directed love imperative will become more evident. Who shall the fit be and in what way shall they be determined is one of our

pressing problems? How can philosophy come to the control of the race?

(23) The aim of the soul is to partially control the flux that comes to it, to carefully study and appropriate the portion of flux that informs us of the environment and to completely control the flux that we emit. In this way we are to master all the external equilibria that we encounter (subject only to the invariant structure of the external world). The explanation of our failure to practice these imperatives promises us the power to overcome this very failure itself. Here is our potter's field of sin in that so few of us have this vision.

(24) Freedom must always be rescued from the false prophets and Pharisees that swarm our temples, legislatures, laboratories, workshops and farms, hiding their contemptible and venomous imperatives behind Bibles and Constitutions. The infinitesimal smallness of these dwarfs is unknown only to themselves. They call themselves shrewd and crafty. They only worship a Christ and a Lincoln in history. They are of the Pilate Judas tribe. The false prophet speaks his selfishness. The real prophet speaks the anguish of his heart. The one is a tin can shining from the reflected light of some servant of God. The other has lived in the wilderness, hidden himself from men, tasted Gethsemane and heralds himself as one who has humbly but earnestly resurected a part of the living God within. To him Bibles and Constitutions are ink marks on paper. Except there is a Resurection of life to these symbols in the soul they must remain but the polished sepulchres of dead prophet's bones. Yet to assert that we are inspired of God is to bring down the jealousy, hate and enmity of the little Pilates, Pharisees and Specialists.

As the Puritans and the other religious refugees set out to mold a community according to their own high imperatives so human society should continue to provide the means for the establishment of similar imperative laboratories. This type of experimental work has barely been started. To assert the postulate that we cannot master death and communicate directly with each other's souls is the pessimism of the present penitentiary of the soul. It is utterly unscientific, irreligious and unphilosophical.

(25) It has been said that the proper study of mankind is men. This is especially true as it applies to microscopic and macroscopic man. The minds of women should not be filled with fashion, gossip, dress and the little impedimenta of small talk but with efforts towards a vast constructive goal. Every hamlet should have its Laboratory and its School. Every citizen should commence his life work with a Ph. D. where Ph. means the highest type of philosophical training rather than a freak specialty. But modern society hurrahs our entry

into Jerusalem with hosannas and then hurries us to the crosses on the hills nearby.

(26) Some think that there is a difference between the "heart" and the "intellect" and that education refers to the latter only. If these people could only see a vision of the world of imperatives and of a universal soul language. Most of us attribute a grand unity to the soul. All philosophies invariably do this. If the inventor and the artist had grabbed the vitamine wealth of the world as has the business man he would no longer be temperamental, visionary and nervous but fat and as hard hearted as any pharoah.

(27) In spite of the common view the Russian church was probably stronger after the debacle of the nation than before. It had only lost its paint. How the flock of a popular pastor disintegrates after the scandal though the scandal may but refine the man. The reason men can only become prophets and saints when they are dead is due to the smallness of the living. The man that has murdered his family by those unspoken diseases may be the most severe critic of the goodly man. The philosophies of most men are at most but superficial ripples generated by the resistance of their own little and perverse natures, philosophies that are worse than useless when the great storm and tide waves of the tragedies of life flow through the innermost recesses of the soul of a man and a nation.

(28) Perspective is utterly essential. Without it infinite detail will swamp and ruin us all. Design in our life course is the philosophical piloting of our course so as to avoid the shoals, the rocks and the gulf stream currents of the irreverently little. Herein lies much of the tragedy of life. We sell our soul's life like Esau for a paltry mess of pottage. It is also true that the only way to meet much detail is to remove it by work. We cannot be too careful however that this detail is necessary and that the doing of it is part of the constructive program of our life's philosophy.

(29) Advertizers proclaim that the shortest quantity we know about is the memory of a man. Sometimes we feel that the nearest approximation to zero is the accomplishments of a lifetime or of a community besides what is consumed in the actual existence and the bare perpetuation of the species. Was Napoleon a real asset to humanity? How much better is mankind for the existence of Spain? Blot out London and New York and after the readjustment would these centers be greatly missed? The narow margin of progress indicates how very important it is to establish idealistic values and an idealistic methodology and book keeping for every individual and every organization that is worthy of survival.

(30) Society is still a scape goat feudal sort of a system. Some Pilate, Kaiser or other devil gets intrenched in power. To oust the raiding robber may require innocent millions to make the supreme sacrifice. This disease infects every family and relationship of humanity. Democracy has done much to alleviate this baronial tendency of husbands, wives, college presidents, executives and administrators. Income and surtaxes accomplish something. Christianity strikes at the root of the matter. If men realized their duties and their responsibilities the problem would be largely settled. To realize these means the attainment of the highest possible philosophy. It is a "grave" question as to how eugenics and philosophy can attain this result when they have to operate upon specialists.

(31) The church should be much less mythological than language, the popular magazine and the Sunday newspaper supplement. "Ministers" do not realize the harm done by their dogmatic superstition and their ancient myths.

(32) What is there more tantalizing and heathenish than fellowships for research work? Youth is given a few crumbs for a few months from the table of a dead rich man and is then turned out to starve.

(33) What is more heavenly than to share a crust of dry bread by invitation with a child? Bite by bite constitutes this communion.

(34) Idol worship wobbles between houses, automobiles, furs, money, power, popularity, fame, servants and the number of people under your direction. The university Ph. D. apes this simian worship of shelter, food and trinkets. All the while millions of children starve for vitamines. Any man that boasts and brags is by necessity an idolator. The very condition that he is a man necessitates this relation.

(35) In the Great War the nations saw the value of economic independence. Few men ever glimpse the significance of philosophical independence. All men should aim for economic, religious, political, moral, spiritual and imperative freedom. Stocks and bonds can easily become scraps of paper as they did in Russia. Our habits and our consciences may become our masters if we are not aware of the nature of our being.

"Practical" men pooh hoo the vagaries of the theorists and yet it takes a French revolution or a Russian debacle to free us from the sins of the "practical" ruling systems. What extravaganza is so hectic as the blind, secretive, selfish cunning of diplomacy, business, industrial research and invention, politics, statecraft and religion as history reveals these? What a contradiction is that of endowing a church, art or a laboratory? Until the time comes that philosophy grants existence to business and religion endows a bank we are in an

age of heathenism, barbarianism and materialism, the age of the beast.

(36) How tragic it is for a church to become dogmatic and oppose a program of research when it is the organ of faith, humility and the Higher Imperatives? The towering stupidity of not even knowing our own ignorance is the distinguishing trait of the common man. He enlarges upon his commonness when he cites some of our present paradoxes and problems and intimates that philosophy is useless. No one appreciates the limitations of any branch of philosophy better than the honest specialist in that branch. It was only the self worshipping bigoted serf of a Pilate that could sophistically ask Christ for a definition of truth.

(37) The abject depravity of the common man is illustrated by his untruthfulness and his yearning to get something for nothing, for perpetual motion and for his insane crucifixion of any soul that does not fall down and worship (respect, cater to and exalt) his contemptible I, I, I methodology. The Politician, the Priest and even the Philosopher of the schools must vastly exterpolate and exaggerate to be popular. The Sunday Newspaper Supplement Science is tame in Exterpolation to the palaver of many a politician and business man.

(38) Prayer is the expression of a sanctified program of life. It should be the earnest of a deep inner imperative and therefore in resonance with the program of the world In its needs it is natural that the faith of the soul should carry its pleadings to a Higher Power. In the periods of the intense inner urgings it is fitting that the zeal and the earnestness of the soul longings should be proportionately manifested. The youthful lover is brought to this attitude by the deep "structures" of his or her inner microscopic life. It is then that the evangelical church garners her richest harvest. The answers to some of these prayers are miraculous. They have been so in the life of the writer. Ask and often more will be given than the earnest beseecher has expected. The instinctive religious conclusions of a race persuade us of a deep harmony among the vital atomic centers and a universal plan, an ordering that cannot fail our idealistic faith as we go trustingly down into the shadows of death.

(39) The hypothesis intimated in the view (75) makes it very certain that if death means the descent of consciousness from a statistical mild macroscopic world to a "condensed" microscopic world, the pronounced characteristics of "heaven" and "hell" are as certain for the spiritual forces as positive and negative is in the microscopic electromagnetic world. It is quite reasonable to suppose that our manner of leaving the macroscopic world will determine our future "heaven" or "hell."

(40) Idealism must be made, not only metric, but the base of all metric description, value and measurement, before it attains its own. Then will Art, Music, Mathematics, Language and Pure Science be emancipated from objective subjection. It is the present artificial metric system in the objective world that lures and seduces the pagan self specialist. It has always been the siren song of the metrical that has tempted the soul, ever since it was able to count the fingers its pre-conscious imperative had formed. It is the space, time and mass of the materialist, the bodily processes of the evolutionist and the dollar of the economist that betrays them.

(41) How tragical it is for the idealist to gown and degree himself in the "University;" to "end" his pronunciamentos with the proclamation that idealism "begins" after the transitoriness of the macroscopic world has been proven; to assert that because satisfaction and the "peace that passeth understanding" is not found in the objective world it is all pervading in the spiritual world? We do not prove these assertions by means of Parables in the Objective World or by what we "own" materially. Let us shed what we "own" and watch the people fly from us as from a leper. Christ, as the Promise of a visible power, is inundated with Hosannas. Christ, as a pure soul, emancipated from the world, is a lone soul in Gethsemane gardens.

(42) The disillusionment of the man of the world (or even the idealist) leaves him in a very critical mood. To answer this, idealism must provide a constructive program far beyond the urge of the amoeba to a suitable ambient medium; the sunshine and the green fields' call to the physical man; and the urge to material, intellectual and heart power in the philosopher. It must define God and the glory of the soul that is emancipated from the shackles of the objective world. All other definitions and values must come to it for their absolute determination. It is the height of paradox that the religion and philosophy of Man should beg for crumbs at the table of business. The reason is that no church or school has been able to perpetuate and develop the idealism of its founders among the youth. To do this is one of the great immediate problems of idealism.

(43) In multitudes of equilibria one phase is usually encroaching upon the other phases. In the home, in the church, in the schools, in any community or nation there are souls selfishly seeking all that they can grasp. As age ossifies these urges to take all and give a minimum, to selfishly integrate to oneself within the broadest possible limits, altruism dies. In order to perpetuate youth philosophy will have to design society so that its ambitions will lie in the fields of giving and

of service. Herein are to be found some of the absolute values of life.

44. The world crucified Christ with the two thieves, those "above" and "below" the "normal." Until idealism can recognize and permit itself to be directed by those "above" it has failed in its opportunity.

45. How the "great" rob the world of dollars, "fame," notoriety, "popularity," "honor" and "happiness." How the necessities of a wholesome youth and education are taken from the children? Only a Christ can appreciate the enormity of this pilfering.

46. How can the world be made prosperous for "all"? It cannot unless that "all" shall be part of the well laid plan of philosophy.

47. Many worldly men lay great stress upon pure and applied science and research work. There is no such distinction. It is made by the specialist and not the philosopher. If society would use "judgment" many of its most serious problems would be solved in short time. The extinction of germ diseases is a typical example. Man must eradicate or command all those situations that now fill him with fear and present forces over which he is powerless.

48. Why must nearly all the efforts of one generation be scrapped to make way for the oncoming cycle? Is civilization to be consumed in perpetuating itself in the youth? Must each person go through the same enthusiasm, ennui and death? Must men only aim to keep the lawn sward of our imperatives shaven? Are we not all to become landscape gardeners?

49. A "man" may preach a radicle sermon of idealism to his specialists and hold materialism in contempt. Yet if that same "man" is tendered a more thorough going philosophy he immediately sinks back to pragmatism and opportunism. Christ's disciples all fled from Him at Gethsemane. Should not every youth be thoroughly taught the most fundamental idealism so that his life may exhibit a minimum amount of opportunism? Every idealist must at least treat every other idealist as a brother.

50. Every youth should be "branded" with the seriousness and philosophy of life. Philosophy and mathematics should be a portion of the cultural training of each of us.

51. Is it wise to carry on a missionary campaign among a people who do not possess the urge to a higher life? Is not the same solution that of instilling ambition and yearning?

52. Evolution is essentially a matter of microscopic impertives. The cycle of the imperatives of the individual cycle may be a miniature of that of the race.

53. Do you not want to live so that you can see the commonness and feel contempt for the actions of your fellows and of yourself and yet keep these feelings largely in reserve. Thus you develop to be independent of the environment..

54. Can a woman be a Christian? What would the life of Christ have been like had He been a woman? Would men flock to such a type of religious leader? How would Christ have lived had He to struggle for the existence of a large family of His own?

55. In order to be great you have to separate yourself from men. To continually compromise with them will wreck any greatness.

56. Every " business " man that favors and worships a man or woman because they have money is an idolater of Satan.

57. Was there ever a woman whose maternal and feminine instincts did not subjugate her philosophical imperatives?

58. If you wish to move an atom you must get its nucleus started. What is the nature of the soul nucleus? The new birth stirs the very nucleus of the soul.

59. The earth moves in a curved orbit " because " it is trying to find the shortest way through a space time continuum in which it has become intangled by the gravity radiation of the sun. This is a parable on the perturbations of the soul.

60. Osler has intimated that the foundations of one's life work should be programmed before one is forty. The fundamental philosophy and the outline of one's future work should be in detail by forty, even by thirty, and to be most effective, they should be sketched by twenty. The aim of an education should be to crystallize such a result as early as possible. One's habits should only be allowed to petrify about the lattice work of our final philosophy of life.

61. Until the time comes when churches and universities plead for piety and love of wisdom as they now do for buildings, numbers and money we are living in the age of materialism.

62. Every man who has not passed the stage of " living to build a house " before he is thirty is lost to idealism.

63. Our civilization, even much of our idealism, is spent in forging our impulses into materialistic " wants." Many priests and research men worship these " wants."

64. Research men do not seem fated to become masters of the forces of society. Wild catting is not a dollar paying investment. Research men always aim to solve problems and hence are forever working themselves out of a job. The lawyer politician is continually scheming to get himself into a job and to perpetuate this job.

65. It has been said "we have a right to live"—to have our impulses answered. Surely the impulsive love of wisdom should be satisfied. Society should accumulate reserves of all the necessities of life, including an enormous store of wisdom. Universities, temples and laboratories should have zones in which they should be responsible for the provision of opportunity and pay to all intellectuals. Distribution of food and wealth is at present bad. Distribution of intellectual wealth and its adequate compensation hardly exists.

66. The only reason a laboratory should exist is for mankind and the workers in the laboratory. A university is only a system of service, an institution of many responsibilities and not a monarchy to be adorned with temples and pyramids.

67. Society sees to it that a piece of paper, a bond, bears interest semiannually in gold. A human being, John Bunyan, an ex-President, Debs, many a Ph. D., many mothers of men and sons of God are scrapped.

68. Never expect an idealist to support your idealism. He turns into the most skeptical materialistic knocker from Missouri as soon as you preach your philosophy to him. He kicks. He rants. He it is then who becomes a practical pragmatist who scorns visions. This may be a reflection of the way his own idealism is accepted. It may be due to his own egoism. His idealism has so often failed to bear fruit that he becomes an idealist only by habit, or superficially or for profit or for advertising purposes.

69. It is harrowing to idealistic youth to see the robberies and shogun dynasties of the university and the temple. Professors and bishops are not far behind the palavering politician and the "big" business man. Many a "successful" man is nothing but a brazen highway robber of the values due to others. Many a presuming idealist is a blatant fake.

70. One of the richest urgings in man to a research life is invariably sacrificed to executive or business activity. The man expects to return to the yearnings of his youth but in real life he finds himself burned out. He is helpless in a new environment. Men who "retire" are derelicts among the going imperatives about them. A man admits his utter failure in life when he simply works to acquire enough to keep him without work so that he can tinker away the remainder of his days.

71. How can we be assured that the souls of men are not parables of the river, the rain drop and the molecule of indigo?

72. We appear to justly view the family with a holy reverence by personifying its relationship into that of a Heavenly Father. But are not many of the characteristics of the Devil and War and Clannishness and Hate and the profoundest and even the most Superficial Evils to be found there too?

73. Why do the philosophical melting pots of so many men make them universal skeptics of everything beside their own chaotic opinions?

(74) What permanent asset is my life to the idealism of the world? How am I meeting my responsibilities? A blank. How is my estate to be perpetuated after my death?

(75) If there is a future microscopic heaven and hell how can the present methodology of a "free" soul determine what its future state shall be? We have an answer in the accomplishments of idealism in this life.

All's "relative" as now we live,
Our "words," nerve "waves" from atom lathes,
Our metric world 'twas "outward" hurled.
Our Science "starts" from mental "parts,"
Space Time's furled as Memory's Herald,
Subconscious thought, "Absolute" Wrought.

We saw foot prints upon the sand,
Its Creature Cause drew in Line Land,
Equations and relations scanned.
Our space and time were bounden fast,
Our eyes o'er all Space Time were cast
To find the Cause ourselves at last.

Yet there's the sand, lo! lo!
'Tis Mother Earth. Ah's woe,
To her we come and go,
Since Father Time says so.

## XVIII. A FUNDAMENTAL PHILOSOPHY OF RESEARCH

It has been said that a University Ideal is that of Mark Hopkins at one end of a log and a student at the other end. We may picture Plato and his school of philosophers and Christ and the Disciples. In our own day a large part of the church, school and the state should find its basic philsophy founded upon the philosophy in the home. The parents should live and teach their children the wisest idealism that is available. Freedom, research, a system of imperatives, the start to a Ph. D. in a speciality as well as in Manhood. should originate in the Home. Libraries, laboratories and seminaries should be a part of every community and of every home life. Even the Baconian idea of the University is to be broadened. A University is not a monarchical, aristocratic, communistic, capitalistic Set of Imposing Buildings to serve as the center of Specialistic Bustle but it is to be the Opportunity for men to know Man and Life.

Civilization is not to become the slave of Production and the development of a top heavy materialistic structure. Large cities, railroads, ships and telephones, with enormous multitudes of striving, struggling men, may result in some sort of evolution, but the aim of the research spirit is to direct this very evolution and not to become the slave of supplying the paraphernalia with which innumerable hosts shall live. Such a civilization eventually throttles itself into the stagnation of an India or a China. Such a materialistic system of research commits suicide in that eventually all the wealth and energy of the people must be spent in simply maintainence. The Great War has well illustrated the precarious position of the masses in large cities. Men are not to be grown for cannon fodder or to be gassed. The future peasants, serfs, ditch diggers, hewers of wood and drawers of water are to be automatic machines it is true. But we are not to spend all our lives in making and operating this automatic machinery. The energy that is put upon expensive fashions, much of the use of the automobile, wreckless tearing down and rebuilding, the excitement over the pandemics of word, phrase and catch philosophies and the lack of responsibility, duty and clear vision on the part of the individual, integrate into terrible monstrosities in the natonal and the racial life. The individual can only do his bit but for that bit he should be made

altogether responsible. Civics must teach an international responsibility in the lower grade schools. Religion, of the universal type, must become a part of the working philosophy of every youth. The important decisions of life may be cataclysmic. A rash marriage, a misstep, a bad vote or an improper statement or thought may mean the weal or woe, not only of the doer, but of countless millions both present and to come. We may be cannon fodder but we are more. There are hundreds of unnecessary languages and literatures. There are thousands of foolish philosophies. Of all weeds these are the worst. Dishonesty takes on all the hues from white to black. In the unique philosophy the effort is made to establish one consistent system.

(117) THERE IS NOTHING A MAN SHOULD BE MORE CAREFUL AND EXACTING ABOUT THAN THE ADOPTION AND THE DEVELOPMENT OF HIS PHILOSOPHY. IT IS INFINITELY MORE IMPORTANT THAN DOLLAR BUSINESS. IT SHOULD RECEIVE INFINITELY MORE OF THE CARE AND ATTENTION OF THE STATE THAN DO THE NATIONAL BANKS. HE WHO IS UNABLE TO HAND DOWN A PROPER PHILOSOPHY OF LIFE TO HIS CHILDREN SHOULD BE SUBJECTED TO A DRASTIC EUGENICS. THE ONLY ESTATE WORTH LEAVING BY A MAN IS HIS PHILOSOPHICAL ESTATE. IF IDEALISM IS TO EVER HOLD SWAY THE WEALTH OF THE PHILOSOPHY OF A MAN MUST BE GIVEN A METRIC VALUATION AND THE DOLLAR MUST BE ONLY A PART OF THE SYSTEM OF VALUES JUST AS GOOD WILL IS NOW ONLY A PART OF THE DOLLAR ASSETS OF THE BUSINESS OF A MAN. A questionaire method had been used for the selection of U. S. army men and officers and college students. How many wars will be required before this same system is used to test for the right to vote or to rear and train children? The age of a Man is not to be told by the number of times he has gone with the earth around the sun but by his philosophical attainments. This philosophical treasure of a nation is to be carefully watched and tended. No idealistic wealth is to be scrapped. Full use is to be made of all. To do this a people must first appreciate idealism.

Freedom and wisdom are to be rescued for the specialist and his specialty, whether he be a banker, a butcher or a farmer. Philosophy and the Laboratory are not to be the eternal patrons of Gold and Chance. Society is to permit opportunities of research to all. Every farmer should be a research man if not the reverse. A knowledge of food is of great importance to us all. The man who does not "read"

as well as publish research work is to have more than the contempt of his community, his estate is to suffer. We are to be Good Samaritans to our pilfered posterity as well as to the man we may happen to see robbed before our very eyes. We know millions will be taken by the white plague so we are as responsible for this suffering in proportion as research opportunities for working upon the problem of consumption are granted us. The higher our position in life the more appalling are our duties and responsibilities. The Dark Ages, in which Egyptian taskmasters of business directed research work, will some time be ended. It is not to be replaced by a luxurious loving, ignorant and iresponsible working class. Research activity is to be pushed by all the zeal, faith and devotion that has inspired the prophet of the past. Religion, philosophy and the research spirit are essentially one. In every man there must be the new birth to the new philosophy.

Of all labors under the sun none require the martyrdom that the word research implies. In its highest sense this spirit is typified by the life of Christ. To enter and to preach a new philosophy of the imperatives of men is of all efforts the most stupendous. To even do research work in a material laboratory in pure or applied science is exasperating enough. Failure meets one at every turn of the way. One has to work alone. No man can direct another unless the latter is essentially an automaton. The world makes fun of our failures if it notices them at all and disputes our successes. Of all men it might be expected that the research man would exhibit the greatest help and sympathy to his fellow worker but this is no at all the case. Christians all profess to a common goal and yet what a record history presents. The worker, and especially the genius, are seldom appreciated through life, at least not while they are dependent.

(118) A Ph. D. COURSE SHOULD CONTINUE THOUGH LIFE. IT SHOULD BE REPRESENTATIVE OF THE VALUE OF ONE'S LIVING. The English method of giving a man a string of letters and a title is a step in the direction of idealism. The trinket and wampum insignia of dollar business may do for the Indians of Manhattan Island but they are not the measures of value in an Idealistic philosophy. Christ was earnest about attending to the business of the Father. We construct charts for the development and the training of children and stop at the most important phase of activity, at least most people do. That the Superiority of the Past has been in streaks, and uncertain, is evident when we consider the castes, the Junkers, the Feudal Lords, the Priests, the Patricians, the Samurai, the Levites ,the Jesuits, the Senators and the Royal Houses. Ancestry, wampum, occupation, silver, gold, oil, food, clothes, education,

talents, success, enthusiasm and even genius have failed to establish idealistic values.

Nevertheless there are measures of great price. The nature and the quality of what we like or what is repugnant to us, our convictions, our aims, our constant study and communion with great souls, our philosophy, the spirit to try and try again, the constant effort to command technique, the inspiration and the vision that wells from our souls and the willingness to work out our own high philosophy are to be some of the elements of our labratory research among the imperatives of the soul. To be common is to drift with the great Gulf Stream on the ocean of life. To be great is to build our own laboratory ship and to sail alone if need be. The Simplicity of mathematics, the Service of Christ, the mastery of our vices and our virtues, the elimination of sin, the removal of error, the interpretation of pain, emancipation from hate and bitterness, optimism, the courage to drink the hemlock of Socrates and be nailed on the Cross of Calvary, the humility engendered by flattery, gentleness, the avoidance of noise, the humbleness of wisdom, the omission of the dogmatic and the failure of the mystic power of Bigness to receive our worship are a few of the topographical features on a proper map of life.

The application of Middle Age philosophies is to be seen in such subjects as the law that holds our institutions in its bondage. Let us consider the Parable of the Patent Office. No people have displayed inventive talents equal to those of Americans and yet our patent system is little better than the symbolism of barbarism compared to what it might be. The patent office acts somewhat like a machine, it is said to grant several perpetual motion patents per annum and it taxes but does little to protect inventors. Secrecy is an evident aim in the preparation of many patents. Unscrupulous attorneys act the part of the ancient priests. Ignorance is rampant. Congress starves the system and the country suffers immeasurably. And this takes place in an institution that should be one of the greatest educational factors in the country. The patent office should be a great fathering university and research institution and its purpose should be to inspire, help and educate inventors in every possible way. Its laboratories should be open to all and patents should be additions to our knowledge stated in a scientific language and not in an ancient and ridiculous legal jargon that serves an only purpose in perpetuating an antique and useless court system. But all the king's horses and all the king's men cannot make a government of lawyers see a vision. Only some French revolution or Bolsheviki debacle can emancipate us from the lawyer politician tentacles that enslave us to the past. In the past the

Puritan, the Quaker, the Royalist, the Hugenot and the Mennonite could go to a New World for Freedom. Society must ever keep open a new world for her prophets and seers.

Yet with all these shortcomings perhaps the individual has never had the opportunities that he has today (excepting areas of war trodden Europe). The tremendous advance in the technique of civilization permits every home to be a laboratory. One family in five in America run an automobile and therefore know something of electromagnetism, the chemistry of rubber and gas engineering. Freedom of speech and of conscience are becoming universal. In spite of the pessimists, love is greater than hate. An important thing for every individual is to get philosophically and technically busy.

But do not be discouraged if you find science as full of the ungodly as business and law. Teachers are invariably idealists but the scientist that is directly connected with the business world soon becomes drunken by its materialism. Where is the man that would go and sell his automobile and give the proceeds to the church; to the poor; to research work on vitamines or the great white plague? A man may be one of ten to start a bank; he may have much more means than he can dispose of but only an infinitesimal few ever support a Christian program in life or even in their wills. Surely wealth carries tremendous responsibility and duty, one unused "talent" will carry one's soul to "outer darkness." Until men have somewhat of this attitude, seared into their souls, they form parts of a society that should not be perpetuated. It should make one shudder to see the Good Samaritan joy ride through a tenement slum section in a limousine.

It is pitiful how apathetic men are to the love of Knowledge. The writer pleaded for means to try the effect of an electric field on light vibrations in his college course in 1903. Not a cent could be gotten. The German Stark (Strong) added lustre to his country by making this discovery. How many Americans would have discovered X rays if they had been given the time for research work? Among others I can mention our fellow townsman, Dr. Wilbur Stine. The writer has begged for funds of a few hundred dollars for what he calls the (Stark) "Strong 2" and (Stark) "Strong 3" effects, the effect of electric and magnetic fields upon light vibrations in the ether. It is interesting to corner the "scientists" in pretension, who have small funds at their disposal. They must admit the experiments are most fundamental. Their mental inertia is that of opposition (they are "elder statesmen") in spirit, they cite crude experiments that have given negative effects (the spirit of the Pharisees and Politicians who worship bible ritual and "sacred" constitutions when it suits them) and their purpose appears to be frustration.

Yet people squander enormous sums in futile research. They emphasize publication where the names of "directors" rank first. They emphasize the necessity of spending money in buildings and apparatus and of brass plating these piles of brick and metal with their own names. They fail to appreciate that research accomplishment is a matter of spirit, conviction and the character that has arisen phoenix like from the ashes in a new birth. Necessity has driven men to accomplish a little in research work but remuneration soon causes reversion to worldliness. Fine technique is of little avail. Only love of research will ever emancipate men to freedom. Only a Christ or a John the Baptist in a wilderness will realize this. Men have never developed any organization that will not eventually strangle and crucify the spirit. Its only advance has been to introduce periodical disturbances by "democratic" elections rather than by the chance cataclysms and holocausts of the ancient monarchicial types. But even the funds at the disposal of scientists are handled by the archaic monarchical systems.

The practical application of the Absolute Imperative of life, the call of the Soul, is the problem of each of us. The writer selected the college, the university and physics because of their appeal as being fundamental. He sees the church as one of the greatest organizations of men. The lodges and the secret orders do not appeal to him because their work is of the memory rather than of originality. His field of research work was selected so that much of it could be done in the home and during spare moments. There does not appear any reason why the children in a home should not grow up in the very midst of a laboratory. The toys and the playthings of the children should be laboratory apparatus and their play should be experiments that have been deliberately aranged. Child talk should contain its philosophy. The work of life should be play in the field of one's greatest visions. Vision, inspiration, wisdom, philosophy and the Entropy System of life should be a part of the home as well as of the school, the state and the workshop. During the period of youthful vision a program, and especially a research program, should be carefully mapped out for the whole of life so that the conservatism and the ailments of old age shall not have us aimless. Our program should be so diversified that we can have many important irons simultaneously in the fire. As we are stopped here and there by temporary and seemingly impassible barriers, let us not batter our selves to ruin against those but temporarily attack other problems and return occasionally to the old problems. Our program should be so sufficiently extensive that many problems are being pushed to a solution in such a way that the pushing is most effective. Steer clear of

any single track research scheme for many circumstances may congest opportunity for advance and reduce accomplishments greatly. A research program may be planned to take us into the fresh air for exercise, it should be cultural and inspiring to the family and the community. This of course frequently means that we must educate the family and the community.

The following is a short outline of a subject of research as to the structure of the ether. It is an example of the method such as might be used to illustrate a metallurgical operation as worked out in a given plant, the organization of a corporation, the plan of a publicity campaign ,the outline of the life activity of a Roosevelt or the drawings of a large building. Every man owes it to himself to blue print the problems of his life and to connect these together by a harmonious ordering of his ultimate imperative. Every man must be a Pharoah to his own soul and build for it an immortal Pyramid of Gizeh. Let us illustrate this view by a research outline on the ether.

1. A Complete Survey and Classification of All Our Knowledge of Ether.
2. The Outline and the Results to be Expected from the Ether Hypotheses.
   (a) The relation between the specific ether theories and the philosophical systems.
   (b) The relation of the ether theories and the atomic scale and the accepted principles of related philosophy.
   (c) An outline of ether theories in terms of their apparent importance.
   (d) A laboratory outline of research work on the ether problems.
   (e) A specific laboratory outline of ether research work that is adapted to your home or your private laboratory.
   (f) Phases of ether research suited for your wife, children and pupils (for summer vacations).
3. The Outline of the Operation, Limitations, Possible Improvements and the Theories of the Apparatus That Have and Probably Will Be Used in Ether Research.
4. The Outline of the Proposed Research Campaign.
   (a) Preliminary research of a rather qualitative and rapidly accomplished kind should be carried on. During this stage the worker should decide whether this work is to be carried on through a large part or the whole of his life. A vacillating policy is not adapted to research work. On the other hand one should view research work so broadly that one will not fall into the pitfalls of the specialist.

(b) An outline should be made of the laboratories, the theories, the limitations and the results of previous researchers and possible improvements in their technique.
(c) Ether entities, internal and external relations and ether antinomies.

5. The Relations of the Ether and the Energy Quanta. The Ether and the Electrons and Positive Nuclei. The Ether and the Macroscopic Entities such as the Matter Atoms and the Stars. The Ether of the "curved" Space Time 4 fold.
6. The Relations of the Ether, the Energy Quanta and the Electric, Magnetic and Gravity Fields of Force.
   (a) Can mental phenomena be an energy partitioning in the ether force fields?
   (b) Try the effect of the most intense force fields on the growth of plants and animals.
   (c) Try introducing matter into life forms so as to increase the above effect. Use iron compounds and radioactive material.
   (d) What effect would radioactive matter have in our own brains?
7. The Relations of the Ether and the Ultimate Units. The Relation of the Ether and Motion. High and Low Velocity Motions. The Motion of Electrons and Positive Nuclei, Force Fields and the Macroscopic Entities in the Ether. The Ether as "curved" Space Time Configurations (Electrons).
8. The Relations of the Ether to Motions of Rotation.
9. The Relations of the Ether to the Acceleration of Entities.
10. What Superposition Effects are to be found in the Ether. The effect of the gravity field on the velocity of light is one of many such possible effects.
11. The Possible Relations of Subjective Phenomena and the Ether.
12. The Mathematical Theories of the Ether.
   (a) The Equations of Maxwell, their meaning and limitations. The World Science of the Relativity Principle.
   (b) The "action at a distance" theories.
   (c) Invariants that appear in the laws that apply or relate to the ether.
13. The Structure of the Ether.
   (a) The various types of ether atoms.
   (b) Ether vortices.
   (c) Ether polarization and displacement.
   (d) Ether stream lines. The ether as a fluid, solid or as a mechanical mechanism.

14. The Advances in General Science that Will Open New Fields of Research in the Ether.
15. The Method of Extremes as Applied to the Ether.
    (a) The effect of the most powerful force fields upon the motion and the polarization of energy quanta.
    (b) Radioactive phenomena and the ether.
    (c) The ether atmospheres about electrons and positive nuclei.
    (d) The effects of high temperatures and long times as indicated in stellar evolution.
    (e) The effect of matter loading on ether properties.
    (f) High velocity effects.
16. The Nature of Residual Phenomena that have been or may be Attributed to the Ether. This is a large realm of phenomena including soul, spirit, memory and mental telepathic effects.
17. Investigate Exceptional Cases.
18. Devise as Automatic and Simple as Well as Exact an Experimental Equipment as Possible. The principle of maximum results with a minimum expense is a phase of the application of the absolute imperative.
19. The Laboratory Ledger.
    (a) The working hypothesis as contrasted to the pure theory. The simulation of reality.
    (b) The problems that can be more easily answered by the laboratory than by mathematics.
    (c) The full realization that your laboratory consists of the universe and that valuable side lights to your problems may be seen in nature's workshop. This phase is especially important in the case of the ether where the suns are enormous sources of the ether radiations.
    (d) The problems that can more easily be answered by theoretical calculations.
    (e) The range of the laws that are known. Analogies to other phenomena.
    (f) The aid and cooperation of other laboratory workers.
20. Plans for the Continuation of the Work in case of Ill Health or Death. It is tragical how little research workers insure the perpetuation of their work for which they have often devoted their lives. This is research suicide that is just as evil as bodily suicide.
21. Use Converse Experiments and Independently Formulated Experiments when the Results are Sufficiently Important. Be Especially Critical of the Conclusions of all Workers. Depend upon their Data rather than Generalized Summaries.

22. Always be Ready to Note Unexpected Results and Hold Preconceived Ideas Loosely.
23. Take Vacations in New Lines of Work so that You Return as almost Another Person to the Old Problems. Every Now and Then a New Laboratory Ledger Should be Started from the Very Beginning.
24. Problems Should be Studied very Earnestly on Retiring to Sleep so that the Subconscious is Kept Busy with Them.
25. The Philosophies and the Experimental Description of as Many Observers and Laboratories as Possible Should Be Outlined.
    (a) How would an Observer manipulate a laboratory in the force fields? In very greatly "curved" Space Time?
    (b) What would be the ether physics of an Observer on a sun beam? Inside an electron?
    (c) What would be the ether physics at the surface of an electron, in a radioactive atom during disintegration, on an atom at the center of the sun, on an x ray beam, at the absolute zero, in the soul or as seen by minds different than ourselves?
26. What is the Main Goal and the Subsidiary Goals of your Program? How valuable will your work be if one or all of these goals are not reached?
27. Give as thorough a description of the experimental phenomena in terms of pure "relations" and of "absolute" entities as mathematics will permit.
28. How does your development of Ether Hypotheses dovetail with the great philosophical World Science and aid in the extension of these?
29. What is your plan of "popularizing" or effectively distributing your work aims to others?
30. How does the increase of microscopic detail prove valuable? Does not certain "relations" become infinite as others become infinitesimal and what is the meaning of this? Is not Space Time so warped at "Point Events," Electron Energy Partitioning, that "measurement" becomes equally exterpolated? If Space Time, Shape and Size warp beyond recognition how are we to plan further research work?

## CLEANING GAS. ELECTRICAL PRECIPITATION OF FUMES

TO CLEAN THE DUST FROM THE AIR OR ANY OTHER GAS: TO REMOVE GERMS FROM GASES: FOR CHEMISTS WHO WISH TO COLLECT SUSPENDED MATERIAL FROM GASES: TO METEOROLOGISTS WHO WISH TO COLLECT THE DUST AND DIRT FROM AIR: TO METEOROLOGISTS WHO WISH TO KNOW THE SOLID AND LIQUID CONTENTS IN GASES: TO SMOKE INSPECTORS WHO WISH TO REMOVE SMOKE FROM GASES: FOR THE COLLECTION OF CEMENT DUST: FOR THE CLEANING OF BLAST FURNACE GAS WITHOUT DESTROYING THE HEAT OF THE GAS AS IS DONE BY SPRAYS: FOR COLLECTING ACID MISTS SUCH AS SULPHURIC AND NITRIC ACIDS: FOR THE PRECIPITATION OF AMMONIUM OXIDE AND CHLORIDE: FOR TAKING POWDERED COAL, SULPHUR, SUGAR, STARCH, MILK, AND ALUNDUM FROM GASES: FOR SAVING GOLD, SILVER AND DIAMOND DUST FROM SWEEPINGS: FOR COLLECTING THE FUMES FROM BOILING PROCESSES AS THE LINSEED OIL KETTLES, ACID CONCENTRATION AND THE PREPARATION OF OTHER DRUGS AND CHEMICALS: THE SEPARATION OF MATERIALS OF DIFFERENT VAPORIZATION TEMPERATURES BY COLLECTING ONE VAPOR WHILE THE OTHER COMPOUND IS STILL A GAS: THE CLARIFICATION OF OIL AND THE PRODUCTION OF GASOLINE: THE RECOVERY OF POTASH FROM COTTON SEED HULLS AND MOLASSES: THE REMOVAL OF SMOKE FROM ROUND HOUSES: THE COLLECTION OF FERTILIZER DUSTS, ZINC SULPHIDES, ZINC OXIDES, POWDERED BORAX AND THE DUST FROM ROTARY LIME KILNS AND CALCIUM CARBIDE FURNACES.

We make a specialty of small precipitators that will operate on direct curents, alternating currents or from batteries, either dry batteries or storage cells. These electrical precipitators can be used anywhere as they are portable. By using a gas meter one has an absolute method of measuring the amount of suspended matter in a gas.

WE ALSO EMPHASIZE THE APPLICATION OF HIGH VOLTAGE ALTERNATING CURRENTS FOR MANY PROBLEMS OF GAS CLEANING. SUCH ELECTRICAL PRECIPITATORS HAVE NO MOVING PARTS AND CAN THEREFORE BE ENTIRELY ENCLOSED SO THAT NO PERSON CAN BE INJURED OR KILLED BY THE HIGH VOLTAGE. IN THE SMALL PRECIPITATORS THE VOLTAGES ARE TOO SMALL TO BE DANGEROUS.

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## TO PREVENT FIRES AND EXPLOSIONS

In many manufacturing and storage processes ELECTRICAL CHARGES are developed by friction, the mixing of dust, the process of electrical induction, the formation of sprays, the action of currents of gas and fume and by various ionization methods that were first understood after the nature of ions had been investigated. We have made a specialty of IONIZATION PHENOMENA IN GASES FOR FIFTEEN YEARS AND ARE IN A POSITION TO INVESTIGATE ANY PROBLEM ALONG THIS LINE THAT YOU MAY HAVE. Many fires and explosions are caused by the discharges of static electricity and frequently these conditions arise and cause fire or explosion without any one being aware of the causes. YOU CANNOT PREVENT ANY ACCIDENT WHEN YOU DO NOT KNOW THE CAUSE OR WHEN YOU CANNOT TELL WHEN THOSE CAUSES OPERATE. On the other hand many fires and explosions can be prevented by preventing the conditions that generate electrical charges. IT IS IMPORTANT THAT INSURANCE COMPANIES UNDERSTAND THE RISKS THAT THEY UNDERGO WHEN INSURING ALL PLANTS THAT ARE SUBJECT TO FIRE BY THE ACTION OF SPARKS. These fire losses are difficult to describe by means of statistical tables for the reason that their natures are called mysterious and are frequently said to be spontaneous. IF YOU ARE LIKELY TO HAVE A SPONTANEOUS FIRE OR EXPLOSION LET US INVESTIGATE YOUR ELECTRICAL CONDITIONS.

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